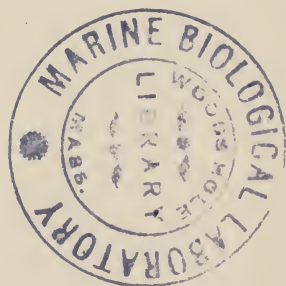


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THE IRISH NATURALIST:

A Monthly Journal

OF

GENERAL IRISH NATURAL HISTORY,

THE OFFICIAL ORGAN OF

*The Royal Zoological Society of Ireland; The Dublin Microscopical Club;
The Belfast Natural History and Philosophical Society;
The Belfast Naturalists' Field Club; The Dublin Naturalists' Field Club;
The Armagh Natural History and Philosophical Society;
The Cork Naturalists' Field Club.*

EDITED BY

GEORGE H. CARPENTER, B.Sc., LOND.

AND

R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

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"	112	"	35	"	<i>Prunus</i>	read	<i>Pyrus</i> .
"	112	"	38	"	<i>deeply-pinnatifid</i>	read	<i>deeply-bipinnatifid</i> .

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The Irish Naturalist.

VOL. I.

APRIL, 1892.

No. 1.

INTRODUCTORY.

IN issuing the first number of the "IRISH NATURALIST," we wish to acknowledge most gratefully the kind encouragement and support which we have received in the establishment of the Journal, and to ask the cordial help of those interested in Natural Science to ensure its continued success and progress.

The fact that no Journal of the kind exists in the country, is sufficient reason for our undertaking. Many observers in all branches of Natural History are to be found in Ireland; they now have a means of comparing notes, and making known to the public the results of their work. Moreover, Natural Science has a most important bearing, unrecognised by the great majority, on the industries of the country; we hope by spreading scientific information, and encouraging scientific tastes, to have some influence for good on the labours of the people generally.

Residents in Ireland, in the past, have done much to advance a knowledge of Natural Science. The names of TEMPLETON, J. V. THOMPSON, W. THOMPSON, HALIDAY, JUKES, HARVEY, and many others, will always be honoured by Naturalists. Yet it must be admitted that much remains to be done before our knowledge of the fauna and flora of the country can be considered to have approached completion. The higher groups, indeed, are fairly known, but the lower animals and plants present an immense field for research, wherein the investigator is certain to be rewarded with new records, and very possibly with undescribed species. As for geology, there will always be room for research there.

Our Journal starts with the support of all the Irish Natural History Societies. The governing bodies of the Royal

Zoological Society of Ireland, the Belfast Natural History and Philosophical Society, the Belfast Naturalists' Field Club, the Dublin Naturalists' Field Club, the Dublin Microscopical Club, and the Armagh Natural History and Philosophical Society have passed resolutions according a hearty welcome to the new magazine, appointing it their official organ, and urging their members to render all possible assistance; and the officials of the Royal Dublin Society and Royal Irish Academy are taking an active and friendly interest in its welfare. The regular publication of the Proceedings of these Societies in our pages will keep our readers well posted up as to what is doing in Irish scientific circles.

While articles, monographs, and local lists will occupy a considerable portion of our space, we would especially invite correspondence and discussion on obscure problems in Irish Natural History, and the communication of short notes on all points worthy of record. These items are invariably of interest, and frequently draw forth further information from other observers.

For the present, at least, our usual monthly issue will consist of sixteen pages. The amount of material already in our hands, or promised at an early date, is sufficient to justify an issue of double that size; but it is thought best to make a modest beginning, and look forward to enlarging the Journal when a matured age and an assured circulation have made success a certainty. To ensure this result, we appeal with confidence to Naturalists both in Ireland and elsewhere. Though our records will always be of primary interest to those resident in our own country, we believe they will also be of value to workers in Great Britain, Europe, and America. The discovery of a species in Ireland may have important bearing on some question of world-wide scientific interest.

As we go to press we receive promise of support from the new Naturalists' Field Club at Cork, a notice of the establishment of which will be found on p. 24. We heartily wish the Cork society a prosperous and useful career, and hope that other centres in the south and west of Ireland may soon follow the example of that city.

RECENT ADDITIONS TO THE LIST OF IRISH BIRDS.

BY A. G. MORE, F.L.S.

THE last two years have been remarkably productive in rare birds; and since December 1889, when the second edition of my list was published, no less than nine species have been added to the Irish avifauna. All these have been recorded at various dates, and four of them have been commented on by Mr. Seebohm, in *The Ibis*, for October, 1891, but the present seems a good opportunity for bringing together the whole, so as to review the progress which has been made in so short a time. The nine birds are:—

1. *Sylvia nisoria*, Bechst.—BARRED WARBLER. One was obtained near Belmullet, Mayo, so long ago as the 24th September, 1884, and luckily fell into the hands of the veteran ornithologist, Dr. J. R. Burkitt who, being doubtful of the name, gave the specimen to Mr. R. J. Ussher, and the bird was then referred to me for identification. It is now in the Science and Art Museum (*Zoologist*, 1890, p. 310).

2. *Sylvia curruca*, Linn.—LESSER WHITETHROAT. A single specimen was obtained by Mr. R. M. Barrington from the Lighthouse on Tearaght Rock, Kerry, where it was taken on the 1st October, 1890 (*Zoologist*, 1891, p. 310). This is a striking example of a bird breeding freely in many parts of England, extending northwards to the South of Scotland, but which, up to the present time, has not even appeared as a rare visitor in Ireland. Like the Nightingale (of which also there is only a single occurrence recorded in Ireland), the Reed Warbler and Tree-Pipit, as well as the Lesser Whitethroat, seem, during the autumnal migration, to find a more direct route to the Continent, and do not make their way westward into Ireland, while, apparently, the rare stragglers which visit Ireland in the late autumn, must come from a greater distance than the opposite shores of Great Britain. Some, like the Yellow-browed Warbler, from far eastward; others, like the Black Redstart in Ireland, and the Fire-crested Wren in Great Britain, from the nearer portion of the European Continent.

3. *Phylloscopus superciliosus*, J. F. Gmel.—YELLOW-BROWED WARBLER. One at the Tearaght Rock Lighthouse, 14th October, 1890, now in the collection of Mr. R. M. Barrington, making the fourth British specimen (*Zoologist*, 1891, p. 186).

4. *Calandrella brachydactyla*, Leisl.—SHORT-TOED LARK. One captured at the Blackrock Lighthouse, Co. Mayo, 11th October, 1890 (*Zoologist*, 1891, p. 186). I shall never forget the occasion when my friend, Mr. R. M. Barrington, produced from one small bag three such extraordinary prizes as the Short-toed Lark, the Yellow-browed Warbler, and a Red-breasted Flycatcher, which he had just received from his correspondents at the Irish Lighthouses.

5. *Turdus migratorius*, Linn.—AMERICAN ROBIN. An adult male, shot at Springmount, Shankill, Co. Dublin, 4th May, 1891, was brought to me when quite fresh, by Mr. E. Williams (*Zoologist*, 1891, p. 219). One more to be added to the nineteen American birds, which have been obtained in Ireland. It is now in the Dublin Museum.

6. *Falco cenchris*, Naum.—LESSER KESTREL. One shot at Shankill, Co. Dublin, 17th February, 1891, had been noticed several

times during the winter (*Zoologist*, 1891, p. 152). It was brought to me for identification by Mr. Tank.

7. *Phalaropus hyperboreus*, Linn.—RED-NECKED PHALAROPE. One shot at Lough Gilly, Co. Armagh, was received by Mr. E. Williams on the 13th November, 1892, and is now on loan at the Science and Art Museum (*Zoologist*, 1892, p. 28.)

8. *Oceanites oceanica*, Kuhl.—WILSON'S PETREL. One at Mossdale, Co. Down, 2nd October, 1891 (R. Patterson in *Zoologist*, 1891, p. 427). Another on Lough Erne, 1st October, 1891 (*Zoologist*, 1891), was brought to me when quite fresh, by Mr. E. Williams. A large flight of Petrels, chiefly the Forktailed, seem to have passed over Ireland about this date. And Wilson's Petrel was also, for the first time, obtained in Scotland, on the 1st of October (*Annals of Scottish Nat. Hist.*, January, 1892).

9. *Anser brachyrhynchus*, Baill.—PINK-FOOTED GOOSE. One shot on Lough Swilly, Co. Donegal, about 19th October, 1891, was sent to Mr. Robert Patterson, who was thus able to identify the first authentic Irish specimen (*Zoologist*, 1892, p. 33). It must not be forgotten, however, that the late Sir Victor Brooke had previously recognised this goose in Meath, but was not able to secure a specimen.

Some of the most interesting of these results are due to the observations carried out by the light-keepers on the Irish Lighthouses, from 1882 to 1889, which were initiated and continued chiefly by my friend, Mr. R. M. Barrington. And we may also hope that research has in some degree been stimulated by the circulars and schedules which we have lately issued in preparation for a new work on the Birds of Ireland, and also by the schedules which have been circulated by Messrs. R. Patterson and R. Ll. Praeger for their forthcoming *Fauna of Ulster*.

There remains one bird to be struck off the list, the Gull-billed Tern, *Sterna anglica* Mont., which was erroneously announced in the *Zoologist* (1887, p. 433), as having occurred near Belfast; but this specimen, which I had the opportunity of examining, proves to be an Arctic Tern, in an unusual state of plumage, being apparently a late-hatched bird of the previous year, which has nearly attained the mature plumage, but in which the black bill and legs, and the dark feathers along the ridge of the wing remain as signs of immaturity; and I may add that Mr. Barrett-Hamilton has shown me a very similar bird, which he obtained on the coast of Wexford.

SEA-WEEDS FROM THE WEST COAST OF IRELAND.

BY PROF. T. JOHNSON, D. SC., F.L.S.

SINCE the publication of the unrivalled work—*Phycologia Britannica*—in the years 1846-52, by the late Professor Harvey of Trinity College, Dublin, one hundred species have been added to the list of the marine Algæ of the British Isles, so

that now we know of some six hundred species. This addition is mainly due to the researches of E. M. Holmes and E. A. L. Batters, who have published a very useful *Revised List of the British Marine Algæ* in the *Annals of Botany* (vol. v., 1890). A year ago a strong committee was formed for the investigation of the marine flora of the coast of Scotland. This committee is at present confining its operations to the Clyde basin. It is very much to be desired that an investigation on similar lines should be carried out for Ireland; the south and west coasts, more especially, would amply repay investigation in the light of the recent discoveries of British and Continental algologists. I was so fortunate as to accompany for a time the s.s. "Harlequin," under the Rev. W. S. Green, in its fishery survey. I spent a fortnight on board in April, 1891, and went from Galway to Sligo. In addition to the acquirement of a large and valuable quantity of sea-weeds from different localities (which pressure of other duties has so far prevented me from working out fully), I got a good knowledge of the coast, which I could not have obtained in any other way, and which will prove of great service to me (and to others) in future algological work. This is not the place to enter into details. One of the most interesting observations was the discovery that a small green floating ball, the size of a pin-head, constantly present in the tow-net catches, was *Halosphaera viridis*, Schmitz. This minute alga had not been previously found on the coast of Ireland. It was first noticed in the Gulf of Naples, and was known there for some years before it was examined by Schmitz, who gave the results of his investigations in the *Mitt. Zool. Stat. Neapel*, vol. i. Later it was noticed independently in Plymouth Sound, by Mr. J. D. Cunningham, from whom I first heard of it. Its life-history is incompletely known, and no doubt could be fully investigated in Irish waters; it was found round the whole coast by Mr. Holt. I was particularly interested in succeeding in finding it in a tow-net catch well out in the Atlantic, twenty-seven miles west of Achill Island. Its importance as a food-supply for the smaller marine organisms must be very great. So far as one can say at present, its season is from March to the end of June; what happens to it in the interval is not known. Two French algologists, the distinguished Dr. Bornet and M. Gomont, have recently discovered in the group *Cyanophyceæ* several genera which possess the power of boring into, and more or less completely destroying the calcareous shells of various molluscs. Happening to catch the low tide at Galway on joining the fishery boat, I found such "bored" shells there, as well as at other points on the coast. In September last I spent a fortnight in sea-weed work on the coast of Clare, chiefly at Kilkee and Miltown Malbay, both well-known as algal localities to readers of Harvey's works. Here I found at low tide growing on *Alaria esculenta*, and in all stages, a *Litosiphon-*

like plant which is new to science, and which I propose to call *Pogotrichum hibernicum*. J. Reinke of Kiel, to whom I sent specimens, tells me he is now describing for the first time the only other known species, *P. filiforme*, found at Heligoland. The Irish plant shows unilocular and plurilocular sporangia, the Heligoland one plurilocular only. At Miltown Malbay I was interested to find tufts of *Dictyopteris polypodioides*, Lamx, growing as an intertidal weed. I had previously gathered this brown alga off the Mewstone in Plymouth Sound, in 12-15 fathoms. This intertidal habitat on the coast of Clare is a marked illustration of the possibility of occurrence of Spanish and other southern weeds on the south and west coasts of Ireland.

Enough has been said to shew that there is waiting for readers of the IRISH NATURALIST, a field of investigation sure to yield rich and interesting results.

THE CROSSBILL (*LOXIA CURVIROSTRA*, L.) IN IRELAND.

BY R. J. USSHER.

IN studying the fauna of a country, one of the most interesting things to note is the increase or decrease of certain species, with the causes of these changes. The decrease of such birds as the two Eagles, the Marsh Harrier, and the Quail, being chiefly the work of man, is rapid and noticeable. The increase of others, due rather to natural causes, is more gradual and less perceptible. We have, however, in the Crossbill an instance of a bird whose recent marked increase has been observed in our four provinces, and has, within the last few years, removed it from the category of an uncertain visitant to that of a resident species.

Thompson can quote but three mentions of it (as a straggler) in the last century. I have been informed by old residents in Co. Waterford, that about the year 1798, great flocks of Crossbills visited this county in the autumn, and committed havoc among the orchards, splitting open the apples, and eating the pips only. This circumstance my father often described to me.

Among the many instances of the Crossbill's occurrence from 1828 to 1846, given by Thompson, only two presented evidence which satisfied him that it had bred in the country. In April, 1856, Mr. Smyth of Headborough shot and gave me two of these birds, and in the following month he saw several others about the same mountain plantation; but it was not until 1867 that nests were found, at Kilkea, Co. Kildare, when the steward informed Mr. Blake Knox that he had seen Cross-

bills building about the middle of February, and had found four nests, two of which contained young birds, on the 10th March; and, though none of these seem to have escaped, there were many young birds in the plantation about 1st May. Twenty or more used to be seen at a time until the middle of summer, when they all left (*Zoologist*, 1868, p. 1133).

Up to this, though Crossbills had been occasionally noticed to breed, they do not seem to have remained; but Sir Victor Brooke, writing to me in August, 1890, said—"The Crossbill settled in Fermanagh long before 1888—certainly nearly ten years ago;" and in March, 1891, he stated that it breeds there, and has been numerous within the last twelve years. I received, in 1891, statements from several counties, chiefly in Leinster, to the effect that Crossbills have been established there for several years, that they are seen, both young and old, at different seasons of the year, and, in most cases, that, my informants have no doubt, they breed. Mrs. Croasdaile places their advent into Queen's Co. as far back as September, 1886. Dr. Donovan saw them at Glandore, West Cork, all through 1887 and 1888. Mr. Patten, of Bray, mentions 10th July, 1888, as the date when he observed the first flock of about twenty-five, old and young. In that year, Mr. Kane heard that a pair frequented a demesne in Westmeath, and had haunted the place for four years previously; while Captain D'Arcy-Irvine, speaking of Fermanagh, Col. Cooper, of Co. Sligo, Mrs. Battersby, of Westmeath, Dr. Benson, of the adjoining parts of Dublin and Wicklow, and Mr. Digby, of King's Co., all mention the increase of the Crossbill in their districts of late years, and express their conviction that it breeds therein. The occurrence of Crossbills has also been reported to me from Donegal, Londonderry, Down, and Galway, and Mr. E. Williams notes them also from Tipperary, Cavan, and Edenderry. In 1888, Mr. de Vismes Kane, being at Monkstown, Co. Cork, was shown a tree in which Crossbills were said to have nested that season.

In June and July, 1888, a remarkable migration of Crossbills into Western Europe took place. They were observed at Heligoland in June, at lighthouses and lightships and the coast, east side of England, and in the Hebrides, in July (*Zool.*, 1888, p. 349). About the same time they invaded eastern France (*Zool.*, 1889, p. 70). This should be borne in mind in connection with their increase in Ireland ever since 1888, and their settlement in localities where they were previously unknown.

My first record of Crossbills here at Cappagh, was that of five, seen by my men, drinking at the stream below this house, on the 26th December, 1887. Several were shot near Cloyne, Mallow, and Doneraile, during January and February, 1888; and on the 6th April I received one from Cappoquin, five miles from here. On the 13th November, I made my first acquaintance with these birds feeding in my plantations, and they have

ever since then remained, and bred year after year. Their appearance, a thing now of common occurrence every month in the year, has become exceedingly familiar. Indeed I know no bird of its size that attracts notice more quickly than the Crossbill, when it is once known. Though its flight is usually above the level of the tree-tops, its loud, rattling call-note makes one look out for it when almost out of sight. Its mode of flying, too, is peculiar. It alternately strikes out fully with a strong vibration of its wings, and, closing them, it sinks a little, to recover itself again by another effort of its wings, thus performing a series of measured undulations in its course from hill to valley, or from wood to wood. Its large round head, with a distinct neck, is often distinguishable when it is perched at some distance, and its singular beak gives it the appearance of holding something in its mouth. I look on the reds and greens of Crossbills' plumage, as protective colouring. On the 8th February, I was attracted by the notes of a Crossbill recording, when, peering into the branches of the Scotch firs, I found that the bird was sitting unconcernedly, quite near me, its russet plumage corresponding with the ruddy hue of the bark.

A flock of Crossbills feeding is described by Mr. Ellison, who met with them in this county, near Clonmel, in June, 1889, and near Shillelagh, Co. Wicklow, the following month (*Zoologist*, 1889, p. 76).

I quote the following from my own journal, 26th November, 1889—"About 11 a.m. I saw sixteen circling about over the plantations on the hills (Cappagh), and finally alighting on the tops of larch at the edge of a grove. At first, several remained like sentinels on the tree-tops, but soon all were busy among the branches, twisting open the cones. I crept close to these trees, while the Crossbills, after satisfying themselves on one tree, flew by ones and twos to a tree nearer to me. In the sunshine I could see several red birds, and others that were yellow-green. The busy and happy appearance of these Crossbills, their bright colours and curious beaks and attitudes, were a sight to delight any lover of nature. One bird went to work on a cone, to which he had to bend, with his head down under the twig he was on, each time he extracted a seed. Another bird would fly from tree to tree, carrying a cone in its beak, and then would hold it on a branch with its foot, while picking it to bits. They were all life, fluttering, feeding, and crying, "gip, gip" occasionally. Suddenly, of their own accord, they took wing to perform one of their airy dances, all uttering their loud call-note. Their flight at such times is much more measured than that of other finches. They seem to luxuriate in it, and to beat time by the successive impulses of their wings. It is strange to watch one of these large Crossbills go far out on a swaying spray of larch (perhaps, head downwards), bite off a cone, carry it to a more steady part of the branch to dissect it,

beginning at its apex, then let it drop and go for another cone, or use its beak in climbing like a parrot.

I have seen a flock on the 8th November, feeding on the immature bunches of the ivy, from which the blossoms had recently fallen, that grew on low ash-trees by the road-side. They have also been seen early in the year feeding on the ground beneath a willow covered with catkins. On 4th April, I watched a Crossbill feeding on the expanded buds of the larch, which, at that time, are favourite food, and with which I think, they feed their young. Mr. Ellison says he has seen them feeding on the catkins of large elms in June. I have never known them to attack apples, as my father described, the orchards, then numerous here, resounding that season with the "crack, crack" of splitting and falling fruit. At that time the planting of fir and larch had not commenced here on a large scale, and the birds, as Thompson suggests, were probably driven to feed on apple-pips, for want of the more acceptable seeds of conifers. There can be no doubt indeed that the increase and settlement of Crossbills in Ireland is due to the increase of mature seed-bearing fir and larch woods.

(TO BE CONTINUED.)

COUNTY DUBLIN, PAST AND PRESENT.

BY PROF. GRENVILLE A. J. COLE, F.G.S.

INTRODUCTORY.

THE following short papers, dealing with a limited area, may possibly serve the wider purpose of illustrating how the geological history of any district may be gradually worked out by successive observations, and how new problems will continually arise as an encouragement to additional research. In the field of historical, as well as mineral geology, the individual Irish naturalist has scope in every county. The development of libraries in the cities provides the means of learning what has been already done; and hence I have not spared references to original papers, since the personality and true merits of earlier workers can never be grasped by a perusal of a mere outline of their results. It is, indeed, cheering to anyone who may undertake local, and often laborious, investigation, to feel that he is one of a great band of observers, who have compiled, during the present century, the pre-historic annals of Ireland. Since references to certain journals may be frequent, the abbreviation *G.S.D.* will be used for the *Journal of the Geological Society of Dublin*, and *G.S.I.* for its successor, the *Journal of the Royal Geological Society of Ireland*, commencing in 1864. The papers in the latter journal will also be found in the

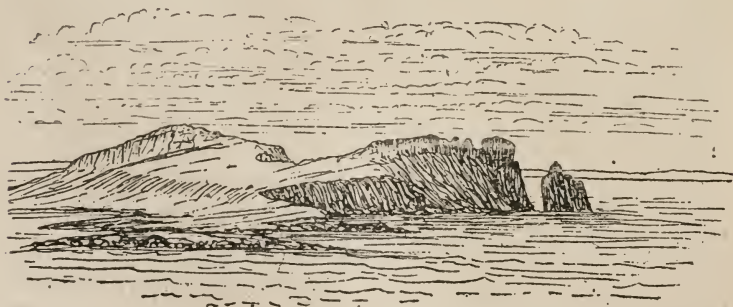
Proceedings of the Royal Dublin Society for corresponding years. It should also be stated that these notes on the geology of Co. Dublin are based on a course of evening lectures given in the Royal College of Science for Ireland in the present year. Several wider geological considerations were then introduced, which it is here convenient to omit.

I.—THE CAMBRIAN PERIOD.

THE oldest rocks in Co. Dublin are those of Howth and the great tract stretching from near Shankill southward into Co. Wicklow, and including there Bray Head and the Sugarloaves. They form a series of shales and quartzites, which underlie the Ordovician (Lower Silurian), and which, consequently, are of Cambrian age, or even older. In the crumpled and wrinkled shales we can recognise the deposits of an old muddy sea; these rocks, so well seen at Bray, were once mere soft clays, which have since been consolidated by the pressure of other rocks deposited on them, and have been folded and squeezed during long periods of earth-movement. Not only were they bent and uptilted before the Ordovician sea washed against their flanks, but they have since been subject to all the movements that have affected the floor of the country up to the present day. And these movements, as we shall see, have been considerable and repeated.

The hard quartzites and "quartz-rocks" associated with the shales, present some difficult features. On the south side of Howth, east of the Needles, pink sandstones can be seen beautifully folded; and one bed lies regularly upon another, clearly deposited, layer upon layer, in the same sea as that

Fig. 1.



Weathering of jointed quartzite, north of Ireland's Eye, from Howth.

which formed the shales. And the pocket-lens, and, still better, the microscope applied to thin sections of the rock, show how even the harder masses are made up of grains of

quartz-sand, like those of modern beaches, with here and there a little pebble, the whole being cemented by silica into the quartzite that we now find.

While examining these very ancient deposits, now cemented together and contorted, we can picture to ourselves the rivers bringing down sand and mud into the sea, which sifted out the materials, as it does now, and spread them out in strata on the quiet floor. There are no signs of the huge flood-waves and whirling catastrophes which some of the earlier geologists invoked to account for the vast masses of material deposited during geological time; we are dealing with rocks at least as old as the oldest known traces of living things, and we find ourselves, notwithstanding, studying conditions marvellously like our own, and very far indeed from the time when the crust of the earth began first to cool around a molten ball.

But further examination of the quartzites shows that they do not always lie regularly, as they should, among the shales. On Howth itself, where they often look so distinctly stratified, the late Mr. John Kelly,¹ in a paper full of accurate observations, held that they were originally quartz-rocks lying lower than

Fig. 2.



Bed of quartzite in slate, east of the Needles, Howth. The shale has become cleaved under earth-pressure, and has passed into slate; but the resisting quartzite has become folded and broken up. Further movement would leave mere "eyes" of quartzite surrounded by slate. Dimensions of surface drawn, about 25 cm. square.

the shales, and that they had been intruded into the latter in a "semifluid or plastic" condition by "volcanic or other expansive power." Mr. G. H. Kinahan² has also contended that

¹ "On the quartz rocks of Co. Wicklow," *G. S. D.* v. (1853), pp. 240 and 255.

² "Geology of Ireland," pp. 14 and 196.

the quartz-rocks are intrusive and dyke-like, not ordinary altered sediments. But when we consider how many thrusts and squeezes these ancient rocks have had to bear, it seems far more probable, as Prof. Sollas has shown,¹ that the hard resisting quartzites have been broken up under the stress, and that the softer and more yielding clays have flowed round about them; so that a mass of quartzite may be found quite out of its proper position, and even cutting across the stratification of the shales, instead of conforming to it. The real sandy origin of these quartzites can again and again be proved, as may be seen in the gritty mass on the summit of the great Sugarloaf, or as Mr. T. Oldham² pointed out as early as 1844, when he produced pebbles from the quartz-rock of Bray. The dislocations and faults³ are proofs of the power of the earth-movements, and the microscope, as Prof. Sollas has shown, reveals the same thing in the minutest details, the old sand-grains being ground to powder on their edges and becoming cracked and elongated, as in all hard rocks in which the particles have been forced into a kind of flow.

If, then, these basement-rocks of Co. Dublin are merely altered marine deposits, there must have been a land formed of still earlier rocks, on the shore of which they were laid down. This shore still remains concealed, but Prof. Sollas has already been engaged in elucidating its position. Very possibly it was in part made of the old crushed and foliated schistose rocks, which are exposed in the western counties, and which underlie the Cambrian in their typical region, Wales.

The Cambrians of Cambria contain fossils, limited in species, but covering a fair range of forms. We have abundant Brachiopods, particularly *Lingulella*, the close ally of the living *Lingula*; rare Lamellibranchs and Gastropods; *Theca*, which may prove to be something between a Gastropod and a Cephalopod; *Orthoceras*, the old straight representative of the Pearly Nautilus; and numerous Trilobites, the well-known animals which died out in the Carboniferous period, but which seem to have been the lords of creation in early Cambrian times. Since they probably stand as links between the Crustacea and the Arachnida, and would doubtless be disowned nowadays both by the scorpion and the woodlouse, it is clear that the life of the Cambrian period may be regarded as primitive, however abundant. Primitive, but in no way primordial; for already geologists have fixed the base of the Cambrian rocks by the presence of a particular Trilobite, *Olenellus*, and the "*Olenellus*-fauna," or group of species found in association with *Olenellus*, marks an horizon below which research is being

¹ *Proc. Roy. Dublin Soc.* vii., part 3.

² "On the rocks at Bray Head," *G. S. D.* iii., p. 60.

³ See Map of Bray Head, by G. A. Kinahan. *G. S. I.* vi., pl. vii.

actively pushed forward. The Longmynd rocks of Shropshire will probably have to be thrust out into the pre-Cambrian; and Prof. Blake¹ has wished to honour the rocks of Bray and Howth by assigning to them a similar antiquity.

This great series of rocks, amounting to some 4,000 feet in thickness, has yielded, however, little in the way of fossils. Worm-tubes have been carefully described from Bray and Howth, and have been distinguished by names which exalt them to the rank of fossil genera. Tubes as much as two feet long have thus been observed by Dr. J. R. Kinahan at Bray;² and the same author has believed that casts of the crown of tentacles which occur around the head of many worms, such as the modern *Serpula*, are traceable in certain diagonal markings in the fossil, called by him *Histioderma*.³ *Haughtonia* consists of clustered worm-tubes found at the north end of Bray Head.⁴

The fame of the Irish Cambrians has, however, gone out into all the world through the discovery by Dr. T. Oldham,⁵ in 1844, of "small zoophytic markings" in the slates of Bray. Prof. Forbes named these *Oldhamia* four years later,⁶ and two species were established. Dr. J. R. Kinahan, however, first accurately figured and described them,⁷ adding a third species *discreta*, and confirming the general impression that the organism was hydrozoan, resembling the Sertularians. Considering how minutely wrinkled the rocks of Bray have become by earth-pressures, the question of the organic nature of *Oldhamia* has been several times raised; and Prof. Sollas⁸ has recently suggested that comparison may fairly be made between its structure and the delicate folds produced by incipient cleavage in some metamorphic rocks. But the radial series of wrinkles described as *O. radiata* remains unexplained; and, as Mr. G. H. Kinahan⁹ remarks, why should *Oldhamia*, if inorganic, be confined to the Irish Cambrians? Clearly we have here a subject which may be in the end conclusively elucidated by local research. *Oldhamia antiqua* has been found at Puck's Rocks, Howth; and both the well known species are widely spread in Co. Wicklow. The search for *Oldhamia* may also be fruitful in revealing traces of other organisms; if not *Olenellus* and its associates, yet perhaps something even more ancient and more interesting. Mr. Joly's paper,¹⁰ pointing out a curious

¹ "The Monian System of Rocks," *Quar. Journ. Geol. Soc. London*, xliv. (1888), p. 534.

² *G. S. D.* vii. (1856), p. 185.

³ *Ib.* viii., p. 70.

⁴ Misprinted "Howth" in the original paper, *G. S. D.* viii., p. 116.

⁵ *G. S. D.* iii., p. 60.

⁶ *Ib.* iv., p. 20.

⁷ *Ib.* viii. (1858), p. 69, and *Trans. Roy. Irish Acad.* xxiii., p. 547.

⁸ *Ib.* vii., pp. 171 and 174.

⁹ "On *Oldhamia*," *G. S. I.* vii., p. 166.

¹⁰ *G. S. I.* vii., p. 176.

relation between the impressed and elevated examples of *Oldhamia*, should be carefully noted; thus, in a number of cases at any rate, on the upper surface of a slab *O. radiata* appears as a depression, while *O. antiqua* is in relief; nor does the latter seem to lie always on a plane of bedding, since it branches continually over irregularities of the rock. Like so many reputed ancient organisms, *Oldhamia* stands upon its trial; and the jury should assuredly be called from the naturalists of Co. Dublin, who are in a position to examine minutely the scenes of its alleged career.

Fig. 3.



Outline of the Cambrian country of Co. Wicklow, from Howth. Bray Head on left, the Sugarloaves farther to right. Granite of Dalkey and Killiney in foreground.

(TO BE CONTINUED.)

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A., F.E.S.

IN compiling the following list I have confined myself to the area contained within a five-mile radius of the city of Armagh. The greater number of the species have, however, been taken within two or two and a-half miles distance.

The surface of the district is of an extremely undulating character, so that while there are not any great heights, there is scarcely any level ground of large extent. The general surface rises towards the south in the direction of the Vicar's Cairn, and falls towards the north in the direction of Loughgall. The geological formation is almost entirely Carboniferous Limestone.

A large portion of the land is under cultivation, but considerable tracts, especially close to Armagh, are used entirely for grazing.

The most distant localities mentioned are Loughgall and the Vicar's Cairn, which are each about four and a-half miles from Armagh. At Loughgall my hunting ground has been in the Manor grounds, along the edge of the lake (Lough Gall) which gives its name to the village. The Vicar's Cairn is the highest point in the district, being 819 feet above the sea level; the specimens were obtained from moss taken from the summit. Lowry's Lough is the source of the town water supply, and lies a good deal higher than Armagh, being 331 feet above the sea level, while the highest point in Armagh is 239, and the lowest, 134 feet above sea level. In the summer the water of the lake falls considerably, and on the beach thus left swarm quantities of beetles.

Mullinure is a tract of low-lying marshy ground falling to 102 feet above sea level. The main portion is never cultivated, a crop of indifferent hay being taken off it, and a few cattle grazed. As it lies so low it is very liable to floods, and on these occasions a rich harvest of beetles is to be obtained from the *débris* washed up by the rising waters. It is about half a mile from my house, and is, consequently, very frequently visited, being accessible and very productive of Coleoptera. I have found that working one spot constantly is a sure way of getting good species, provided, of course, that the locality is a suitable one. It will be noticed that Mullinure and Lowry's Lough have had most of my attention, and the result speaks for itself. Drummanmore is practically a continuation of Mullinure, being the adjoining townland. Towards the east there rises a steep hill which falls as sharply into a valley, in which lie Drummanmore lake and Edenmore, or Drummanbeg lake. Loughnashade is on the western side of Armagh. It is a small lake close to the well-known Navan Fort. The marshy ground adjoining, and the drains running into the lake, have produced several good species. The Folly is a kind of public park just outside the town, with a little stream running through it, which further down its course is called the Dean's River, where it flows past what used to be the Deanery, but is now called Dean's Hill.

There are upwards of 700 species in my list, representing all the great divisions of the British Coleoptera. The *Longicornia* are, however, only represented by one species, owing to the district being unsuited to them, from the absence of any large tract of wood.

Of the species in my list, 246 appear not to have been recorded from elsewhere in Ireland; this is merely because I have been working here steadily *all the year round* since 1884, while other districts have either not been touched, or worked only for a short time.

The specimens have all been captured by myself, with Mrs. Johnson's assistance, except a few that were picked up by some of my pupils, and brought to me. Notices of most of those mentioned will be found in the *Entomologist's Monthly Magazine* from 1884 to the present time. No full list has, however, yet been published of the Coleoptera of the district, and, so far as I know, this is the largest list of Irish Coleoptera yet published. That of the Dublin district, published in 1878, for the British Association, contains 623 species, and Mr. Haliday's list, published in the *Proceedings of the Belfast Naturalists' Field Club* for 1885, contains 528 species. Both these lists cover much more extensive districts, yet mine is larger, and for the reason I have mentioned above—that my work has been continuous, at one spot, all the year round.

I hope that this list, as showing what a little earnest work can produce, may stir up others to investigate the Coleoptera of their districts. I have been for some time trying to compile a complete list of the Coleoptera of Ireland, but have found great difficulty from lack of materials. I shall, therefore, be very glad to hear of anyone taking up the study of this order, and I shall be only too happy to give any help I can to any such intending coleopterist. In the present list I have followed the nomenclature and arrangement adopted by Canon Fowler in his work on the Coleoptera of the British islands.

CARABIDÆ.

- Cychrus rostratus**, L.—Beech Hill in moss—not common.
Carabus nemoralis, Müll. } Common throughout district.
C. granulatus, L. }
Notiophilus biguttatus, Fab.—Common throughout district.
N. substriatus, Wat.—Lowry's Lough, Mullinure, Palace Demesne.
N. quadriguttatus, Dej.—Palace Demesne—rare.
N. aquaticus, L.—Mullinure in moss—not common.
N. palustris, Duft.—Mullinure, Edenmore, in moss—fairly common.
Leistus fulvibarbis, Dej.—Drumbee, Beech Hill, in moss—not common.
L. rufescens, F.—Mullinure, Edenmore, Dean's Hill, sweeping and in moss—not common.
Nebria brevicollis, F.—Common throughout district.
N. gyllenhalii, Sch.—Mullinure, Killooney—not common.
Pelophila borealis, Payk.—Lowry's Lough, under stones and among plants on edge of lake from April to October. I took a single specimen in flood rubbish at Mullinure in April, 1891. It is most plentiful in June and July.
Blethisa multipunctata, L.—Lowry's Lough, under stones and plants on muddy parts of lake shore—not common.
Elaphrus riparius, L. } Lowry's Lough, and on muddy margins of
E. cupreus, Duft. } various ponds—common.
Loricera pilicornis, F.—Common throughout district.
Clivina fossor, L.—Common throughout district.
Dyschirius globosus, Herbst.—Very plentiful in flood rubbish in Mullinure.
Badister bipustulatus, F.—Pretty common in moss, under stones, etc.
Chlaenius nigricornis, F.—Lowry's Lough, under stones on edge of lake—not plentiful.

- Bradycellus verbasci**, Duft.—Common in moss, under stones, etc.
B. similis, Dej.—Mullinure—uncommon.
Harpalus rufibarbis, F.—Mullinure, Dean's Hill—not common.
H. ruficornis, F.—Common throughout district.
H. latus, L.—Common throughout district.
Anisodactylus binotatus, F.—Lowry's Lough—not common.
Stomis pumicatus, Panz.—Mullinure, under stones and in flood rubbish.
Pterostichus cupreus, L.—Fairly plentiful in the district.
P. versicolor, Sturm.—Mullinure—not common.
P. madidus, F.—Very common throughout the district.
P. niger, Schall.—Common under stones, etc.
P. vulgaris, L.—Common throughout district.
P. nigrita, F.—Lowry's Lough, etc.,—common under stones.
P. gracilis, Dej.—Edenmore, Loughnashade—not common.
P. minor, Gyll.—Mullinure, Loughnashade, in moss—pretty common.
P. strenuus, Panz. } Common in moss, etc.
P. diligens, Sturm. }
P. vernalis, Gyll.—Edenmore, Mullinure, in moss—not common.
P. striola, F.—Common throughout district.
Amara aulica, Panz.—Mullinure under stones—not common.
A. ovata, F.—Mullinure, Palace Demesne, Edenmore—not common.
A. acuminata, Payk.—Fairly distributed through district.
A. communis, Panz.—Common throughout district.
Calathus cisteloides, Panz.—Common throughout district.
C. mollis, Marsh.—Dean's Hill—not common.
C. melanocephalus, L.—Common throughout district.
C. piceus, Marsh.—Palace Demesne, Folly in moss.
Pristonychus terribilis, Herbst.—Outhouses in Cathedral crypt.
Anchomenus dorsalis, Müll.—Common throughout district.
A. albipes, F.—Lowry's Lough, etc.,—common under stones near water.
A. oblongus, Sturm.—Lowry's Lough, Mullinure,—common under stones, and in moss.
A. marginatus, L.—Lowry's Lough and banks of ponds—very plentiful.
A. parumpunctatus, F.—Common throughout district.
A. viduus, Panz.—Mullinure, Lowry's Lough in moss, etc.,—pretty common.
A. micans, Nic.—Folly in moss—rare.
A. fuliginosus, Panz.—Common throughout district.
A. gracilis, Gyll.—Mullinure, in moss; Lowry's Lough under stones, etc.
A. piceus, L.—Mullinure, in moss; Lowry's Lough on edge of lake—fairly common.
A. thoreyi, Dej.—Lowry's Lough—rare.
Olisthopus rotundatus, Payk.—Mullinure, in moss—rare.
Bembidium rufescens.—In my own garden—one specimen.
B. quinquestriatum.—Near Armagh—rare.
B. obtusum, Sturm.—Mullinure, in moss—common.
B. guttula, F.—Mullinure, in moss.
B. mannerheimi, Sahl.—Widely distributed, and plentiful.
B. biguttatum, F.—Mullinure, in moss—rare.
B. aeneum, Germ.—Mullinure, in flood rubbish—not common.
B. clarki, Daws.—Mullinure, Lowry's Lough, etc.—common.
B. doris, Panz.—Mullinure, in flood rubbish; Lowry's Lough, on muddy banks.
B. lampros, Herbst.—Common throughout district.
B. affine, Steph.—Near Grange—rare.
B. bruxellense, Wesm.—Lowry's Lough, under stones—not common.
B. littorale, Ol.—Common throughout district.
B. bipunctatum, L.—Lowry's Lough—not common.
B. flammulatum, Clairv.—Lowry's Lough, under stones, at roots of reeds, etc.
Trechus micros, Herbst.—Mullinure, in flood rubbish—one specimen.

- T. minutus**, F. } common in moss, etc.
 var. **obtusius**, Er. }
Dromius linearis, Ol.—Mullinure in moss—pretty common.
D. meridionalis, Dej.—Palace Demesne, Mullinure, Dean's Hill, under bark.
D. quadrimaculatus, L.—Palace Demesne, Mullinure, Castledillon, under bark.
D. quadrinotatus, Panz.—Palace Demesne, under bark.
D. melanocephalus, Dej.—Common throughout district, in moss, etc.

(TO BE CONTINUED.)

NOTES.

BOTANY.

Cuscuta epithymum. Mr. A. G. More contributes to the *Journal of Botany* for January, a note on this plant, of which he has received a fine series of specimens gathered by Mr. J. Ernest Grubb at the west end of the sand-hills at the Rabbit Burrow, near Tramore, Co. Waterford. It is here parasitical chiefly on *Thymus*, but also on *Lotus corniculatus*, *Trifolium repens*, and *Galium*. Mr. More considers that this plant may now definitely take its place in the Irish flora. He is inclined also to refer to this species, the *Cuscuta*, gathered by Mr. R. W. Scully in 1887, on the Banna sand-hills in Kerry, and recorded as *C. trifolii*; and also the *Cuscuta major* recorded by Threlkeld as "growing in great plenty in the dry sandy banks near Mayden Tower, near Drogheda." At the station last named, however, Mr. More searched for the plant unsuccessfully. The localities of Ballybrack and Fassaroe, Mr. More refers to *C. trifolii*.

Vaccinium vitis-idaea. In the *Journal of Botany* for March, Mr. A. G. More draws attention to several existing low-level records for this species, in the hope that a renewed search on some of our large inland bogs may lead to its discovery at low elevations. The records which he quotes are "large bog near Backlin, Co. Westmeath" (*Herb. D. Moore*); "bog in Crevetenant, near Ballynahinch, Co. Down," and "bogs at the southern extremity of Lough Neagh" (Templeton, *Catalogue of the Native Plants of Ireland*).

ZOOLOGY:

CRUSTACEA.

Galathea strigosa ON CO. DOWN COAST. A specimen of this Crustacean was sent to me from Donaghadee on the 21st January. It appears to be somewhat uncommon round the Irish coast, as Thompson only mentions a few localities where he had obtained it, and he characterises it as being in "limited numbers."—Robert Patterson, Belfast.

INSECTS.

COLEOPTERA AT HOLYWOOD, CO. DOWN. On Jan. 20th I was enabled by the kindness of Mr. R. L. Praeger to capture a few beetles near Holywood. The main locality was in Cultra Wood. Owing to the severity of the weather there were not as many beetles about as might have been expected. The specimens were obtained from under stones, in moss (of which I brought a bagful home), and in water. Under stones were *Pterostichus strenuus*, *Quedius fuliginosus*, *Philonthus laminatus*, *Othius fulvipennis*, and *Lathrobium brunnipes*. The water net brought me *Haliphus lineatocollis*, *Hydroporus atriceps*, Crotch (*morio*, Dej.) *H. pubescens*, *H. discretus*, *H. nigrita*,

H. palustris, *H. planus*, *Agabus bipustulatus*, and *A. nebulosus*. The moss was, of course, productive of a far larger number of species than the other methods of capture. I obtained from it *Notiophilus palustris*, *Loricera pilicornis*, *Pterostichus strenuus*, *Anchomenus parumpunctatus*, *Bembidium lampros*, *Cercyon melanocephalus*, *Cryptopleurum atomarium*, *Aleochara morion*, *Homalota vicina*, *H. aterrima*, *H. circellaris*, *H. fungi*, *H. aegra*, *H. analis*, *H. atramentaria*, *H. nigra*, *Conosoma lividum*, *Tachyporus chrysomelinus*, *T. hypnorum*, *T. brunneus*, *Tachinus rufipes*, *T. marginellus*, *T. subterraneus*, *Bolitobius lunulatus*, *B. trinotatus*, *B. pygmaeus*, *Quedius fuliginosus*, *Q. semiaeneus*, *Philonthus varius*, *Ph. politus*, *Xantholinus linearis*, *Othius myrmecophilus*, *Lathrobium brunnipes*, *Stenus impressus*, *S. atratulus*, *Oxytelus rugosus*, *Trichopteryx atomaria*, *Scydmaenus collaris*, *Cononimus nodifer*, *Phyllotreta undulata*, *Erirhinus scirpi* and *Strophosomus coryli*. I give *Aleochara morion* and *Homalota aegra* with some reserve, as I have not types of either. Most of the species are common, but that was to be expected under the circumstances. I have given all the species taken, as there does not seem to have been any record from the district since Haliday's time.—Rev. W. F. Johnson, Armagh.

BIRDS.

GLAUOUS AND ICELAND GULLS (*Larus glaucus* and *L. leucopterus*), IN CO. DONEGAL. There has apparently been a flight of these rare northern gulls on our north-west coast, extending from Donegal to Mayo, within the last few weeks. On the 12th February, W. A. Hamilton, Esq. J.P. of Ballyshannon, Co. Donegal, sent me a very fine Glaucous Gull (*Larus glaucus*), in the mottled immature plumage. It measured thirty-one inches, from which I would conclude it was a male, although the organs were not sufficiently developed to be distinguished. On the 15th February, Mr. Hamilton wounded another gull which he says was apparently of the same size and plumage as the one he first sent. It dropped in the sea and was not recovered. However, I think there can be no doubt it was a second Glaucous. On the 17th February I received from Mr. Hamilton an Iceland Gull (*Larus leucopterus*), in the plumage of the second year. Unfortunately it was too much decomposed to preserve, as it had been shot about ten days previously, but the much smaller size and greater comparative length of wing, distinguished it from *Larus glaucus*. On the 22nd, Mr. Hamilton sent me another immature Iceland Gull, shot on the 20th, and the head, wing, and leg of a third which he had procured a short time before and had thrown away. I submitted the head, wing, and leg to Mr. R. Warren of Ballina, who says they belong to an Iceland Gull of the second year. Then, on the 3rd of March, I received from Carrick, Co. Donegal, a fourth Iceland Gull also in immature plumage. This bird measured 21 inches, wing 15 inches, and had been shot so long that it could not be preserved. From these six occurrences we may assume that there was a flight of Glaucous and Iceland Gulls on our north-west coast in February. [These are the birds referred to by Mr. Hamilton in the *Field* for February 27th and March 5th.]—Robert Patterson, Belfast.

GOOSANDER (*Mergus merganser*) IN STRANGFORD LOUGH. On the 3rd March a fine male Goosander in full plumage was sent up from Strangford Lough, Co. Down. In the north-east of Ireland this bird is decidedly rare, and the present occurrence, so late in the season, is worth recording.—Robert Patterson.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

SIR ROBERT BALL, F.R.S., President of the Society, has been appointed to the Lowndesean Chair of Astronomy at Cambridge. The Council has passed a congratulatory resolution, regretting the consequent departure of Sir R. Ball from Dublin.

Among the animals recently presented to the Gardens are two Genets and a Civet Cat, from V. W. Brown, Esq., and two Guinea Pigs from J. A. Higgins, Esq. The purchases include three Lemurs, a Caracal, a Polar Bear, and two Opossums.

The Report of the Society for 1891, is of considerable interest. The success in breeding lions, which has long been a marked feature in the gardens, continues. The lioness "Queen," bought in 1883, has had, since then, nine litters, numbering twenty-eight cubs of which only one died. Twenty-five were sold for about £1,000, and one male, "Romeo," and one female, are still in the gardens.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 21st.—The Club met at Dr. W. Frazer's. Mr. W. F. de V. Kane showed a Trematode (*Octodactylus inhaerens*, Dal.) from the gills of a Ling. He does not think that this species is rightly identified by Van Beneden as his *Pterocotyle palmata*, neither the contour, eggs, nor suckers of the specimen agreeing with Van Beneden's description.

Mr. G. H. Carpenter showed the palp of a male *Tegenaria* taken at Glendalough, Co. Wicklow, and described as a new species (*T. hibernica*), by Rev. O. P. Cambridge. The form of the radial apophysis differs from all known British species of the genus. Its nearest allies, *T. nervosa*, Sim., and *T. larva*, Sim., are from the eastern Pyrenees, so it seems likely we have here another link between the fauna of Ireland and that of the southern and alpine districts of Europe.

FEBRUARY 18th.—The Club met at Mr. W. Andrews'. Mr. G. Pim showed a Mould (*Myxotrichum deflexum*). It consists of minute tufts of hyphae with short acute branchlets which are deflexed, giving the appearance of a tiny larch tree. The history of the specimen is remarkable. Last autumn Mr. Pim received from Professor Scott a minute *Peziza*, found growing on a distempered wall at the Royal College of Surgeons. Some of this was sent packed in *Sphagnum*, to Rev. H. W. Lett. He could not find the *Peziza*, which being very fragile, had got lost on the way, but on the *Sphagnum* he did find the *Myxotrichum*. As this mould is usually got on wall-papers, etc., there can be little doubt that it had originated at the College.

Mr. Kane showed a larva of a parasitic Copepod, *Cecrops lotreillii*, which possesses six pairs of elongated appendages besides the three naupliar pairs. He concludes from this that the nauplius stage is very short, and that the animal develops rapidly into a free-swimming copepod. Risso states that it is found in great numbers in the Mediterranean, floating far from land, and unattached to any host.

Mr. Carpenter showed the terminal abdominal segments of the male *Halobates regalis*, sp. n., taken by Professor Haddon in Torres Straits.

Dr. Scharff showed the aberrant pelagic Opisthobranch, *Phyllirhoë bucephalum*, Pér, from the Mediterranean; the transparency of body of this mollusc makes it an excellent microscopic object, the internal anatomy being clearly visible. A parasitic jelly-fish (*Mnestrá parasitica*) seems always to be found attached to the anterior region of *Phyllirhoë*.

Mr. A. F. Dixon exhibited a vertical radial section through a marginal spherule of *Actinia equina*. The section showed the spherule to be a club-shaped, hollow outgrowth of the upper part of the body wall. The outer layer of ectoderm of the outgrowth is entirely made up of nematocysts

arranged with their long axes vertical to the surface of the spherule. Beneath this is a very deep granular so-called nervous layer which is separated from the endoderm by a very thin layer of mesogloea. The endoderm is devoid of pigment granules, the blue pigment which, during life, makes the spherule so conspicuous, being entirely external to the layer of nematocysts. This superficial position of blue pigment explains a fact sometimes observed during life—viz., the complete separation of a blue layer leaving behind a colourless but apparently otherwise intact spherule.

Mr. F. W. Moore showed the pseudo-bulb of an orchid, *Oncidium cecilleae*, attacked by a fungus. The orchid from which the pseudo-bulb was taken was imported from Carthage in 1886, but no sign of the fungus appeared until 1891. The fungus proves to be a new species—*Myrothecium cinereum*, Cooke.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JANUARY 5th.—The President, PROFESSOR M. F. FITZGERALD, B.A., in the Chair. Mr. John Lanyon, C.E., read a paper on "The Belfast City Central Station and Railways."

JANUARY 27th.—The President in the Chair. Mr. L. L. Macassey, B.L., C.E., read a paper on "The Filtration Works for the Improvement of the Water-supply of Belfast."

FEBRUARY 2nd.—The President in the Chair. Mr. Seaton F. Milligan, M.R.I.A., read a paper on "The Early Christian Architecture of Ireland."

FEBRUARY 24th.—The President in the Chair. Dr. John McCormac read a paper on "The Influence of Language and Environment upon the Individual through the Nervous System."

MARCH 1st.—The President in the Chair. Mr. William Gray, C.E. M.R.I.A., read a paper on "The Essentials of House Sanitation and How to Secure Them."

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 19th.—The President, MR. JOHN VINYCOMB, F.R.S.A.I., in the Chair. Rev. W. F. Johnson, M.A. F.E.S., read a paper on "The Beetles of the Belfast District." The reader said that his chief sources of information regarding the Coleoptera found in the vicinity of Belfast, were the lists of the collections of the late A. H. Haliday, F.L.S., and Robert Patterson, F.R.S., published by the Naturalists' Field Club, and the collection of local beetles in the museum of the Belfast Natural History and Philosophical Society. Mr. Johnson then described the various genera and species which have been taken in the district, mentioning their characteristics, habitats, and the records of their occurrences, and concluded by strongly urging members to pay some attention to this interesting order, which were well worthy of close observation. A discussion followed, in which Messrs. John Hamilton, William Gray, R. Lloyd Praeger, and Rev. C. H. Waddell, M.A., took part.

FEBRUARY 16th.—The President in the Chair. Rev. C. H. Waddell, M.A., read a paper on "The late Mr. John Templeton's Work among the Birds of the District, and some MS. Notes of his, recently discovered." The reader stated that a copy of Montagu's *Ornithological Dictionary* had lately come into his possession, which had formerly belonged to Mr. Templeton, and contained a number of manuscript notes by that eminent local naturalist, a selection from which Mr. Waddell read. Most of these notes have been published by Thompson and others.

Mr. W. J. Knowles, M.R.I.A., read a paper on "The Occurrence of Flint Flakes in the Glacial Gravels of Ballyruder." He exhibited a number of flints obtained by him in these gravels, which he considered showed undoubted evidence of human workmanship. He thought that sufficient attention had not been given to the rude forms of implements

which must have been the forerunners of more finished types, and held that trace of man's existence might be expected in an interglacial deposit. Mr. F. W. Lockwood considered that further information and evidence, both as to the nature and age of the deposit, and as to the flints in question, were necessary, before it could be proved that traces of man occurred in the Ballyrudder gravels. Mr. S. A. Stewart did not consider that the flints on exhibition showed any sign of human workmanship. Mr. R. Lloyd Praeger held that the deposit in question could not possibly be considered interglacial, as its fauna was more intensely boreal than even that of the Boulder Clay, the term interglacial signifying a cessation of glacial conditions. A recommendation was sent forward to the Committee that a systematic exploration of the Ballyrudder deposit should be undertaken.

Mr. Francis Joseph Bigger gave a notice of an *amphora* recently obtained by sponge-divers in the Bay of Ekanjik, near Rhodes, which was on exhibition.

Mr. R. Lloyd Praeger exhibited and described a large skull of the Irish Elk (*Cervus giganteus*) recently obtained in the centre of a bed of peat three feet thick, at a depth of thirty-four feet below high water mark, in excavations made for a wall of a new branch floating dock at Spencer Basin, Belfast. Above the peat were some thirty feet of blue marine clays. This series of deposits has been fully described by Mr. Praeger in a paper recently read before the Royal Irish Academy.

MARCH 15th—Microscopical Evening. This was the First Annual Meeting of the Microscopical Section of the Club. The Committee presented the Annual Report, and the evening was devoted to an exhibition of microscopical objects and appliances, the exhibits being illustrative of a microscopical survey of the animal kingdom. Some twenty microscopists attended with their instruments, and there was a large gathering of members and visitors.

DUBLIN NATURALISTS' FIELD CLUB.

FEB. 9th.—The President, DR. E. J. McWEENEY, in the Chair. Mr. J. M. Browne, B.A., gave a paper on "Some Coleoptera from the Dublin District." (This paper, which includes several new records, will be shortly published in the IRISH NATURALIST.) Messrs. H. K. G. Cuthbert, W. F. de V. Kane, and G. H. Carpenter took part in the discussion, which turned chiefly on the famous *Mesites tardyi*, and the bearing of its distribution, and that of some other Irish animals, on the problem of the former physical geography of Western Europe.

MARCH 8th.—The President in the Chair. Mr. T. Chandlee read a paper entitled, "The Multiplication of Species," in which he dealt with the recent changes of nomenclature in systematic botany, and deplored the extent to which "splitting" has been carried by some naturalists, specially in the genera *Rosa*, *Rubus*, and *Hieracium*. Specimens were exhibited showing different forms of leaves on the same plant, believed to indicate a transition between supposed species. Mr. H. C. Hart, Professor Johnson, Mr. W. F. de V. Kane, Mr. G. H. Carpenter, and Professor Cole took part in the discussion. Messrs. Kane and Carpenter showed some critical species and varieties of Lepidoptera. Mr. F. Neale sent for exhibition some Lepidoptera from the Limerick district; one of these, *Nisoniades tages*, from Cratloe, Co. Clare, had not before been taken in the locality.

ARMAGH NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JANUARY 11th.—REV. W. F. JOHNSON, President, in the Chair. Mr. W. H. Phillips, of Holywood, read a most interesting paper entitled, "A Gossip about British Ferns." The lecturer referred to the remarkable number of varieties of the British Ferns, and enumerated the chief

divisions into which they fall. He then gave an account of some of the principal varieties, with many interesting details. The paper was illustrated by numerous and beautiful specimens. A discussion followed in which Mr. W. McCrum and the President took part. It is to be regretted that owing to the bad weather the attendance was meagre.

FEBRUARY 11th.—The President in the Chair. Mr. W. McCrum read a paper on "Ulster Traits and Characteristics."

ROYAL, DUBLIN SOCIETY.

FEBRUARY 17th, 1892.—LORD ROSSE in the Chair. Professor W. J. Sollas, F.R.S. read a paper on "The Basal Cambrian Conglomerate of Howth." The conglomerate consists of angular, sub-angular, and rounded fragments of quartzite and slate. It is exposed in cliff sections at Balscadden Bay on the northern side of the peninsula. Sir Archibald Geikie was inclined to regard it as a volcanic breccia, but the total absence of volcanic rocks at Howth seems conclusive against this view. Professor Sollas regards this conglomerate as the base of the Cambrian series. He considers that the preponderance of slate at Bray, and quartzite at Howth, indicates the existence of the shore-line of the ancient ocean to the north of Howth, its proximity being there shown by the existence of this basal conglomerate.

The discussion was opened by Professor Cole, who thought that much of the formation could be explained by the shattering of the quartzite, and the flowing of the slaty rock around its fragments. Mr. W. W. Watts pointed out the great difficulty of explaining the existence of quartzite pebbles in a matrix of the same rock.

Professor G. A. J. Cole, F.G.S., read a paper on "The Variolite of Annalong, Co. Down." A specimen in the Survey collection, labelled "Variolite," and collected by the late General Portlock on the shores of Co. Down, led Professor Cole to the re-discovery of the rock in Ireland. Variolite (a devitrified basalt), is a very rare rock, and was thought to exist in the British Isles only in Anglesey, where it was discovered by Professor J. F. Blake. The dyke at Annalong is only exposed at low water; it is of large size, measuring four feet in width, and traceable for eighty-two feet. The passage from true basic glass to variolite can be traced in the dyke.

Dr. J. Joly read a paper entitled, "A Speculation on a Pre-material Condition of the Universe."

MARCH 16th.—PROFESSOR W. N. HARTLEY, F.R.S., in the Chair. Dr. G. J. Stoney, F.R.S., read a paper entitled, "Proposal of a Standard Gauge to assist in appreciating the small Ultra-visible Magnitudes of Nature." Professor F. J. Bell's report on the Echinoderms collected on the cruise of the "Fingal" was submitted to the meeting.

ROYAL, IRISH ACADEMY.

FEBRUARY 22nd.—The President, DR. J. K. INGRAM, in the Chair. Rev. George T. Stokes, D.D., read a paper on "The Knowledge of Greek in Ireland between 500 and 900, A.D." Mr. R. Lloyd Praeger read a "Report on the Estuarine Clays of the North-east of Ireland." (The author proposes to contribute an article on the subject of this report to the IRISH NATURALIST at an early date, so no abstract of his paper need now be given.) Mr. Praeger also read a "Report on the Botany of the Mourne Mountains, Co. Down," which had been prepared by Mr. S. A. Stewart, F.B.S. Edin., and himself, under a grant from the Academy. The district reported on covers 180 square miles, almost the whole area being occupied by lofty mountains. Geologically, the district consists of granite, and Silurian grits, the latter chiefly on the lower grounds. The Mourne mountains form the highest mountain-chain in Ulster, and the most easterly highlands in Ireland. The flora is a somewhat rich

one, numbering nearly 600 species of phanerogams and higher cryptogams. Alpine plants are, however, very poorly represented, as are also plants of the Atlantic type; while plants of the Germanic and Hibernian types are altogether absent. The Hawkweed flora of the district is rich, fourteen different forms occurring. Of these, *Hieracium auratum* is new to Ireland, and *H. argenteum* has only previously been recorded from Co. Galway. *Rubus ammobius* is also an addition to the Irish list. Besides the above, the following are additions to the flora of district 12 of "Cybele Hibernica":—*Drosera intermedia*, *Rubus nitidus*, *Rosa involuta* (type), *Saussurea alpina*. Eighteen* of the species enumerated are new county records. An appendix is given in which are entered plants which have been recorded from the district, but which the present reporters failed to refind. Among these, we note with interest that the *Asplenium acutum*, recorded by Sherard from the Mourne mountains, turns out to be a form of *Athyrium filix-femina*.

CORK NATURALISTS' FIELD CLUB.

MARCH 18th.—A meeting was held at which it was resolved to establish a Naturalists' Field Club for Cork. The following officers were elected:—President: Professor M. M. Hartog, D.Sc., F.L.S.; Vice-Presidents: Messrs. Denny Lane, M.A., W. H. Shaw, B.E., and W. J. Knight, LL.D.; Hon. Treasurer: Mr. J. Gilbert; Hon. Secretaries: Messrs. W. B. Barrington and J. L. Copeman. Miss H. A. Martin, M.R.C.P., with Messrs. T. Farrington, M.A., F.C.S., and F. R. Rohu, form the provisional Committee.

NOTICE.

Contributions (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the Editors, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before 15th of the Month.

Natural History Specimens sent to the Editors will be referred to authorities for identification.

G. H. CARPENTER,
Science and Art Museum, Dublin.

R. LLOYD PRAEGER,
Holywood, Co. Down.

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No. 2.

PHOTOGRAPHING OBJECTS OF NATURAL HISTORY WITHOUT A CAMERA.

BY GREENWOOD PIM, M.A., F.I.S.

THE method of obtaining photographic transcripts of natural history specimens without using a camera, to which I wish to call attention, is by no means new. In fact, producing such impressions was the very earliest form of photography that was practised by Watt, Sir Humphrey Davy, and others.

These early attempts produced nothing but outline, and it seems to have been reserved for Mr. Joly, of Trinity College, Dublin, to show, quite recently, that by suitable exposure, no little detail in such things as leaves, flowers, etc., can be obtained, thus producing, in many cases, charming pictures, and not mere silhouettes.

The plan is available for anything which is flat, or can be flattened without losing its characteristic form, and which is not too thick or too opaque; Mr. Joly having got good results with even such unpromising subjects as monkshood and fox-glove.

The materials and apparatus are extremely simple, and almost no photographic skill is requisite. An ordinary printing frame, for printing from photographic negatives; a sheet of clear glass, and some pieces of sensitized paper are all that are absolutely essential, if the paper used be that known as "ferro-prussiate." A convenient size is $7\frac{1}{2}$ inches by 5 inches, for frame, glass, and paper. All can be obtained from any dealer, for about one shilling and sixpence. The sheet of glass is placed in the frame; a spray of the flower to be copied, previously somewhat pressed between a couple of sheets of blotting paper, is placed thereon, next a piece of sensitized paper, taking care to shield it from light as much as possible in so doing. The back of the frame is now put in, and the plant, paper, and glass are brought into close contact. The frame is then placed in the sun, and after a sufficient exposure, the

duration of which must be learnt by a few trials, the exposed portion of the paper becomes a deep blue, while that protected remains white. The light, passing more or less through the plant according as the different parts are more or less translucent, of course effects the sensitive surface in proportion; a wash in clear water "fixes" the print by removing the material sensitive to light. We now have a representation of our plant in white shaded with blue, on a blue ground. The main objection to such prints is the colour, but this can, if desired, be altered afterwards by suitable treatment. The advantages of the blue paper are its cheapness, that no chemicals are required, and that it does not readily stick to the plants. The next simplest paper to deal with is the printing-out platino-type paper, often called "Pizzighelli paper," from its inventor. It only requires fixing in dilute acid, and gives a pleasing brownish-black colour, but the paper is costly. Both these methods were practised by Mr. Joly most successfully last summer, among the Swiss mountains, and with freshly gathered flowers; the printing frame and paper being readily carried in a satchel, and water being everywhere abundant. To fix the platinotypes probably the vinegar cruet would suffice at a pinch, if no more suitable acid were forthcoming. In this way a charming collection may be formed, in many respects more satisfactory, and with less trouble than the collections of dried specimens one often sees, though perhaps not scientifically so valuable.

But we are not confined to paper photographs. By acquiring a little more skill in photographic manipulation, we can make most effective lantern slides from the small flowers, and also, as will be alluded to later, from many other natural objects. Such are best made at night by artificial light, as the exposure is more easily regulated than by daylight. I must here assume that the ordinary mode of making lantern slides by contact from photographic negatives is understood, and for details refer to the many treatises thereon obtainable from photo-material dealers. The standard size for lantern slides in this country being $3\frac{1}{4}$ inches square, we are practically confined to subjects coming within this area, and the method of procedure is as follows:—A piece of clear glass is placed in a suitable printing frame in the dark room, and the spray of flowers, say of the bog pimpernel, *Anagallis tenella*, is placed thereon, a sheet of white paper beneath the frame facilitating the arrangement; over this is placed a sensitive plate, preferably one specially made for lantern work; this must be done by non-active light. The back of the frame being put in, the whole is exposed to light, either gas, or an inch or two of magnesium ribbon. The plate is then developed and fixed, and we have a negative of the flower, *i.e.* light or dark ground, and with the lights and shades reversed. This may itself be used as a lantern slide, or a print on to a second plate may be

taken, when of course the lights and shades are as in nature, and the delicate details of venation, etc., if the exposure has been suitable, are beautifully rendered with a roundness and solidity almost incredible.

Following out this idea I have experimented with seaweeds, zoophytes, mosses, ferns, etc. Many of the hydroids, such as *Sertularia*, *Plumularia*, and their allies, make excellent slides, the first or negative slide showing the object as brilliantly lighted on a dark ground, there being little or no detail in the interior, and the outline being sharp and crisp. The foliaceous *Flustra* are also suitable, but care must be taken against overlap, which will completely destroy all internal structure. Seaweeds are somewhat more difficult to deal with, as they require in many cases to be set out in water on the clear glass, and then carefully lifted out, and the superfluous water blotted off, before the sensitive plate is applied. When the species is comparatively strong, such as *Plocamium*, this is easily done, but in the more delicate forms, like *Ptilota*, the ramuli run together the moment the water is removed. In this case I have used the plate entirely wetted, with fair success, the only drawback being large air bubbles, which somewhat disfigure the slides. Dried seaweeds are frequently very opaque and most of the detail in the stems has disappeared, but *Delesserias* and other flat species can be readily photographed dry. Wherever there is detail in the interior, it is better to print a slide from the negative plate, as then lights and shades are not inverted.

The exposure must of course be learnt by experience, but it may be noted that the red seaweeds, when wet, transmit actinic light freely, and so require but short exposure, especially to magnesium. A similar remark is true of such ferns as *Trichomanes* (Killarney fern) and *Hymenophyllum*, and other ferns require of course more, being more opaque.

There is one direction in which this method of photography might, I think, prove useful, though it is travelling a little out of the title of this note. I notice that Messrs. Newton & Co., of London, advertise a series of lantern slides of grasses, "made from accurate drawings" for popular educational purposes. Would it not be feasible to make *direct* photographs in the manner above described of the whole plant on plates sufficiently large, and from these in the camera make reductions, just as slides are now made from photographic views of all sizes. Such would, of necessity, be more faithful than any drawing could possibly be, while structural details could be brought out in a way that photographing direct in the camera could not produce.

Whether such photographs of natural objects would be of much value to discriminate species, is I think, doubtful, but it seems to me that they might be very useful in many ways for class purposes, especially now that the optical lantern is becoming so valuable an adjunct in teaching.

Professor Bottomley, of the Yorkshire College, Leeds, has recently published a useful little brochure on this subject, showing that the lantern can be successfully used in a fairly lighted room, and states that it is used in nearly all the lecture rooms of that institution; a special hand being constantly employed in producing the various slides required by the different teachers.

THE CROSSBILL, (*LOXIA CURVIROSTRA*, L.)
IN IRELAND.

BY R. J. USSHER.

(Continued from p. 9.)

CROSSBILLS need water, and may frequently be seen flying down from my hill plantations to the stream and drinking there. On the 4th July last, as I approached my house, I heard an old Crossbill uttering his call-note as he sat sentinel on the top of a silver fir. Five others then alighted on the roof of the house over the kitchen yard, and drank from the eave-gutters which held water since the previous day's rain. They took no notice of me.

This tameness or indifference to man's presence seems to show that the ancestors of this race of birds have lived beyond the range of human persecution; but let a Sparrow Hawk appear, and they are immediately on the wing, performing lofty flights with angry notes. I have attempted to put up a flock to show a friend their flight, etc., while we stood beneath the trees where they were feeding, but though we shouted and flung stones into the air they would not stir. Nor let it be supposed that they shrink from the vicinity of a house, if only it be surrounded by haunts to their liking. On the top of a hill here stands an inhabited house surrounded by masses of old Scotch firs and larches; this spot, called the Giant's Rock, has been the chief resort of Crossbills. I have leaned against the house and watched them feeding within a few yards, nor were they alarmed when people talked and dogs barked beneath them. Nay, of the five nests discovered, three were within short distances of this house, one being in the top of a low fir over the very pathway that led from the house to the offices where animals were kept, and close to the latter buildings. The birds used to pick up materials and carry them to their nest while observers stood by. I once set men to erect a wire fence beside the trees containing a Crossbill's nest. The female, which was probably laying, sat for a long time on one of these trees calmly gazing at the men, and not betraying any uneasiness. More than once on my ascending trees to

inspect nests, the female would not remove beyond the next tree, and soon returned when I descended. In no case did our inspections lead to a nest being forsaken. When I climbed up to one that contained young, the parent birds perched on the same tree within four feet of me, uttering their note excitedly. But the most singular instance of a Crossbill's boldness was that of a female sitting hard on eggs, who not only would not move, but bit the stick with which she was poked, and when lifted off her eggs with it to see what was under her, held on to the nest with her claws, and sank into it again when the stick slipped away. (*Zoologist*, 1889, p. 180.)

The song of the Crossbill has most frequently been heard from February to April. While the female was hatching, the male has been seen shuffling and flapping his wings with delight, flitting through the firs near the nest. He would take a circuit about the group of trees singing on the wing, and then perch on a tree-top continuing his song. I have also listened to a male singing quite distinctly in October. The song is quaint but usually harsh, and often consists of the repetition of one note, followed by the repetition of another. These are very diverse, and one bird will take up one note or two, another bird another note, and continue using it. Thus the burden of one song will be *chit, chit, chit*, repeated sharply, and then a loud creaking note most like the *twee-e-e* of the Greenfinch, but repeated more than once with gusto. These sounds strike the ear at a distance. Then may follow "saw-sharpening" notes, reminding one of the Great Tit, but not uttered so loudly, and some low and sweeter notes; or the saw-sharpening may be the only song. Upon April 2nd, I heard a Crossbill utter for some time a sound new to me, a sort of *twirr*, like the chafing of a wheel or of a tightened cord vibrating against something else.

The Crossbill sits, while singing, on the leader or a top shoot, but may continue his notes while flying to another tree. The song is oftenest heard early, before eight a.m. The ordinary call-note can best be translated "gip, gip." This is uttered in a very shrill key by the male, when, for instance, he comes to feed the female, but she expecting him continues, though hatching, to utter from the nest a different note like "yep, yep," or "yup, yup," not so loud as that of the male. I often hear this, evidently used as a call for food. A brood of young birds when following their parents through the branches on 21st May, uttered an eager cry for food, like "chit-oo, chit-oo, chit, chit."

In February these birds usually pair. Of the five nests discovered here the earliest was not commenced before March, for on the 10th the birds were carrying the twigs of which the foundation is formed, and on the 13th they brought moss for the body of the nest; on the 20th I saw them stripping off bits of Scotch fir bark, and apparently taking them to the nest. On the 20th

March, another pair of Crossbills were seen picking up sheep's wool for their nest, in which the female was found hatching four eggs on the 28th. The latest of the nests was being built on 13th April; on the 20th the female was sitting; on the 25th I ascertained that there were four eggs, and on the 11th May, I saw the young birds in it. They were not feathered yet, but had greyish-black down, much the colour of black wadding, giving them a very different appearance from the young of other Passeres. Their enormous upper mandibles, overlapping the lower, looked striking. On the 18th May these young had left the nest, so that its story was completed within five weeks. The five nests were all among the branches or tops of Scotch firs. The first, now in the British Museum, South Kensington, was near the termination of a large lateral branch, about forty feet from the ground, on the borders of a plantation on the hill slope. The nest was overhung or shaded by the luxuriant tufts of the pine needles. This was the only nest that I interfered with. Three other nests were in the tops of the firs about the Giant's Rock, a hill-top; and the fifth nest was in the top of one of a group of stunted Scotch firs about twenty feet high, on the summit of the Black Hill, 566 feet above the sea, exposed to every wind that blows. They were all well-concealed. One built against the leader, where a bend occurs in it and several little lateral branches diverge, looked from below like an enlargement of the crooked leader. Another was built in a little bower or cage, formed by the divergent, curving, smaller branches and tufts, at the culmination of a main branch that grew upwards. The trees selected were not in the heart of any mass, but on or near the margins of groups of trees. The foundation platform of the nest, when present, is composed of strong twigs of fir and larch, and is much wider than the nest itself. The body of the nest is of dead grass or stems, or of moss intermixed with wool and grass, but no feathers; occasionally a tuft of lichens occurs. A nest from Sweden in my collection, which wants the foundation, is composed of tufts of fine hair-like lichen, mixed with a little moss and strips of bark, which are plentiful externally.

The female when hatching was often observed to rise and wriggle and turn round in the nest, though we had no snow at that season. Mr. Nicoud imagined that this movement was to shake off falling snow. (*Zoologist*, 1889, p. 71.)

The nestling Crossbill, until after it is fledged, has the edge of the upper mandible overlapping the lower on both sides equally, but the point soon begins to turn on one side. One that we caged near the nest was fed for nearly a fortnight by its parents. It was then in the striped plumage. When taken in the hand it would try to bite, but did not flutter nor struggle. It managed to open the door of its cage and was lost.

It is in June and July, when the young broods have formed

into flocks, that Crossbills are most apt to wander about the country or even to migrate. How long they continue to feed their young at large is a curious question. I have seen one take food from another on the 26th February, and Mr. Moffat seems to have seen the same thing in County Wexford on 15th January, two Crossbills in a flock having put their beaks together repeatedly. This he interpreted as an act of courtship, but as it was done in a flock, why may it not, like the following, have been an instance of an old bird still feeding a young one of the previous year? Throughout March, 1892, four Crossbills have kept in company about the Giant's Rock. On the 28th I observed the red bird, the old male of this family party, pursued, evidently for food, by another that was full-grown, and not a bird of this year.

Of the five pairs whose nests we found here, three males were red and two were golden yellow. The male now in the British Museum is one of the latter. Another yellow male was large, active, vigilant, his mandibles conspicuously crossed, and was decidedly the most wary Crossbill I have seen. This inclines me to think that Wheelright was right (*Zoologist*, 1862, p. 8001), and that the most mature plumage is yellow.

The Parrot-Crossbill (var. *pityopsittacus*) was not recognised in Ireland until January, 1889 (*Zoologist*, 1889, p. 181), but during the autumn and winter of 1890-91, all the specimens of Crossbills received by Mr. Williams from different parts of the country, were of that large race (*Zoologist*, 1891, p. 112). I have never, to my knowledge, met with the Parrot-Crossbill, but then I have killed none except the two in the British Museum.

Mr. E. Williams records (*Zoologist*, 1889, p. 266), under the sub-specific name of *rubrifasciata*, Brehm, a variety of Crossbill from Edenderry, in which the tips of the wing-coverts were buff, forming two bars, and he quotes in relation to it the remarks of Professor Newton who had never seen it before. This rare variety is not to be confounded with the White-winged Crossbill (*Loxia bifasciata*), a distinct species.

COUNTY DUBLIN, PAST AND PRESENT.

BY PROF. GRENVILLE A. J. COLE, F.G.S.

(Continued from page 14.)

II.—THE ORDOVICIAN PERIOD.

WHEREVER the shore-line of the sea of Bray and Howth may have been, in early Cambrian or even Precambrian times, by the end of the Cambrian period the marine deposits

were themselves upheaved, and formed island-masses, round which new strata were unconformably laid down. The fossils of this second system of rocks prove it to be of Ordovician age, the term "Ordovician" being now generally adopted in place of the much disputed "Lower Silurian" employed by the Geological Survey and many text-books. We cannot enter here into the long war of words which made both the terms "Upper Cambrian" of Sedgwick, and "Lower Silurian" of Murchison distasteful to disinterested combatants. Professor Lapworth has fortunately given us a name which both parties can accept with dignity.

The Ordovician system includes, in the home of the ancient Ordovices, (1) the Arenig series, with its huge volcanic masses, Arenig-fawr, Cader Idris, and the Arans; (2) the Llandeilo series, with the famous Ffestiniog slates, and with some continuance of volcanic deposits; and (3) the Bala series, with richly fossiliferous limestones, and an enormous outpouring of tuffs and lavas, to the hardness of which we owe Snowdon, and many other precipiced mountains in North Wales.

In County Dublin the Ordovician rocks have been altered on the south by the invasion of the granite; but at Skerries, in the north, they come out clearly below the Carboniferous, and crop out again in the interesting promontory of Portraine.

Fig. 4.



Lambay Island from Portraine. Irregularly disturbed limestones and shales on the headland in foreground.

The fossil species show that this Portraine series is of Bala age. The coast is easily struck east of Donabate station; and the oldest rocks exposed lie directly opposite Lambay Island. Here a mass of grey compact limestone, representing an old

coral-reef and its associated shell-banks, is uptilted from beneath more clearly stratified layers of alternating limestone and shale, the latter, as seen in the picturesque little headlands (fig. 4), showing numerous folds and sharp contortions. In the section by Mr. Du Noyer¹ the more shaly beds are represented as wholly above the limestone; but detailed mapping on a larger scale may prove that some of them are equivalent to it, having been deposited upon the flanks of the main bank of shells and coral at the same time as it was slowly accumulating. Such limestone aggregations very rapidly become compact, and even crystalline in modern seas, and the waves roll blocks of consolidated limestone from their margins into the surrounding sediments. At Portraine similar action has produced bands of coarse conglomerate, which may be seen freely in the northern half of the coast section, and which are folded in with the more finely grained deposits near the main limestone mass.

The fossils of the reef are partly silicified, owing, doubtless, to the destruction of siliceous sponges, radiolarians, or diatoms, and the deposition of their material by gradual replacement in the calcareous shells and skeletons of the other organisms. This flinty character causes them to stand out above the level of the rocks when attacked by waves and weather. Among the corals, the isolated cups of *Cyathophyllum*, with numerous septa, are conspicuous; so is also the chain-coral, *Halysites*, the rows of tubes, in which the polypes once dwelt, resembling, when viewed from above, the links of a chain. The brachiopods, more closely than the actinozoa, ally these beds to the Bala series of Wales. *Orthis* and *Strophomena* have yielded several species, as may be seen in Mr. Baily's useful list.² Thirteen species of trilobites are on record, though their remains lie well hidden; and eight gastropods and two early representatives of lamellibranchs have been found here or on Lambay Island. In a band of black shale, running at right angles to the shoreline, north of the more northern martello tower, the hydrozoan *Diplograptus* can be found in occasional patches; this graptolite, and others with a similar arrangement of two rows of cellules, back to back along the axis, are typically Ordovician; while modern marine hydrozoa are common upon the shore, ready for comparison. The sea also throws up multitudes of lamellibranchs, *Cyprina*, *Cardium*, *Solen*, and the like, and gastropods, such as *Turritella*, *Purpura*, *Buccinum*, and *Cypræa*; but not a single brachiopod, nor a single coral is likely to reward the most careful search. These animals are still represented in British and Irish seas, but the proportions of the several groups of marine life have been utterly reversed since Ordovician times. Moreover, scarcely a single genus,

¹ Memoir of Geol. Survey of Ireland to sheets 102 and 112, p. 45.

² Memoir of Geol. Survey to sheets 102 and 112, p. 12.

and not a single species, has been able to struggle on unaltered through the long series of changes which Co. Dublin has since then undergone,

Thus at the present day the British seas contain one species of brachiopod to every twenty-five species of lamellibranchs, and every thirty-six of shell-bearing gastropods; while in the British Bala series we have the lamellibranchs and gastropods about equal in point of species, and the species of brachiopods equal to those of the two groups put together. Numerical predominance of individuals is, however, a safer test of relative importance; and here at Portraine brachiopod life is at once seen to be abundant, while true molluscan individuals are very rare.

In the spring of 1891, Mr. Walcott recorded the buckler-like plates of very early types of fishes, as occurring in Colorado, in the Trenton series, the upper Ordovician of America.¹ So the sea of Co. Dublin may not have been absolutely destitute of fish, but these remains are the oldest hitherto recorded, and the first British fishes are found at the top of the Silurian.

The Ordovician shales may be well seen in the southern parts of the county, where the Dodder and other streams have cut down sufficiently through the covering of drift. A fine section occurs near Dargle Bridge on the road from Bray to Enniskerry, and the schist formed from the shales by contact with the granite is nowhere better seen than on the Killiney shore.

Fig. 5.



Microscopic section of volcanic ash, north end of promontory of Portraine. Fragments of formerly glassy lavas, with felspar crystals, lie in a compact ground of finer ash. $\times 30$.

On Ireland's Eye, moreover, the smoother ground on the back of the quartzites (fig. 1 in our last number) is formed of Ordovician shales.

¹ *Nature*, xliii, p. 425.

But one of the most interesting features of the Ordovician of Co. Dublin is the abundant evidence of volcanic action. In the upturned conglomeratic strata, north of the coral limestone of Portraine, one can see, at low water, blocks of greenish rock containing crystals of felspar. Beds of fine-grained purple and green volcanic ash also occur, showing that crystalline and glassy materials were being thrown out from some neighbouring vent into the Ordovician sea. The microscope aids us in recognising these materials (fig. 5); but the visitor can easily detect the fragments lying in the ordinary sediments. At the south end of the promontory, a massive development of igneous rock comes up below the sandy shales. Part of this shows stratification and an ash-like character; part shows the steam-vesicles of a lava-flow, now infilled with calcite. The greater portion of Lambay Island is formed of a "porphyry" that has broken through the Ordovicians in a molten state; this handsome rock, which deserves to be widely known as an ornamental stone, is little inferior in effect to the famous antique green porphyry, quarried by the Romans in the Morea. It was for a time unable to rise through the rocks above it, and large crystals of felspar¹ developed under conditions of pressure and slow consolidation. Then relief from pressure came, through some local movement of the rocks; the mass, with its contained water, began to flow upward, bearing the "porphyritic" crystals; and at the surface, as in all volcanos, the water of the molten mass burst into steam, scattering the fragments of lava far and wide. At times more gentle action caused lava-flows to move outward from the crater; the accumulation of these and of the tuffs and ashes would build a conical mountain above the level of the sea; and hence probably on the site of Lambay Island, in Ordovician times, a volcanic isle was reared, fringed with coral banks as in the present Pacific Ocean. Away in the south one could have seen a similar cone constructed about Tallaght; while farther still huge clouds of dust and steam would hang above the great volcanos of Rathdrum and eastern Wicklow. The activity seems to have been less intense than in corresponding times in Wales; but all across the open Ordovician sea, isle must have been answering isle with frequent explosions and outpourings of dark fluid lava or viscid natural glass. The materials in Co. Dublin were andesites and aphanites, rocks with some sixty per cent. of silica; but farther south highly-silicated lava-flows of obsidian were poured out, comparable to the black glassy masses of the Yellowstone Park.

The glass has crystallised through slow subsequent alteration; but the original structures of fine curving shrinkage-

¹ These have been incorrectly described as Orthoclase (*G. S. J.* iv., p. 44); though much altered, they may safely be referred to the lime-soda felspars.

cracks ("perlitic" structure), and spherical aggregates of imperfect crystals ("spherulitic" structure), remain to assure us of its original condition.

For such volcanic isles, and for similar products, we need not at the present day go to eastern seas. The Lipari Islands, north of Sicily, serve as representatives of the Ordovician cones of Co. Dublin. And quite recently the eruption between Sicily and Tunis¹ has shown us how submarine action flings up pumice and scoriæ to the surface, where they float until water-logged, finally sinking to be included in the shell-beds, or the sediments from the land.

(TO BE CONTINUED.)

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A., F.E.S.

(Continued from Page 18.)

HALIPLIDÆ.

- Brychius elevatus**, Panz.—Dean's river—not common.
Haliplus obliquus, Er.—Loughnashade—not common.
H. confinis, Steph.—Lowry's Lough—not common.
H. fulvus, F.—Lowry's Lough—common.
H. ruficollis, De G.—Common throughout district.
H. fluviatilis, Aubé.—Loughnashade—not common.
H. lineatocollis, Marsh.—Common throughout district.

DYTISCIDÆ.

- Noterus clavicornis**, De G.—Loughgall, Mullinure—not common.
N. sparsus, Marsh.—Loughnashade, Mullinure, Lowry's Lough—pretty common.
Laccophilus obscurus, Panz.—Lowry's Lough, etc.—common.
Hyphydrus ovatus, L.—Loughgall, Lowry's Lough—common.
Coelambus quinque-lineatus, Zett.—Lowry's Lough, etc.—common.
C. inæqualis, F.—Common throughout district.
C. novemlineatus, Steph.—Lowry's Lough—not common.
Deronectes assimilis, Payk.—Drummanmore Lake, Lowry's Lough—not common.
D. depressus, F.—Common throughout district.
D. duodecim-pustulatus, Fab.—Dean's River—plentiful at certain spots.
Hydroporus pictus, F.—Common throughout district.
H. lepidus, Ol.—Pond beside railway in Drummanmore, Lowry's Lough—not plentiful.
H. rivalis, Gyll.—Dean's River—rare.
H. davisii, Curt.—Dean's River, Lowry's Lough—scarce.
H. lineatus, F.—Common throughout district.
H. tristis, Payk.—Mullinure—rare.

¹ G. W. Butler, "On the Eruption N. W. of Pantelleria, October, 1891." *Nature*, xlv., p. 251.

- Hydroporus umbrosus**, Gyll.—Mullinure, Lowry's Lough—not common.
H. gyllenhalii, Schiödt.—Mullinure—not common.
H. morio, Dej.—Mullinure, Drummanbeg Lake—pretty common.
H. vittula, Er.—Common throughout district.
H. palustris, L.—Common throughout district.
H. erythrocephalus, L.—Common throughout district.
H. memnonius, Nic.—Mullinure, pretty common.
H. obscurus, Sturm.—Bog near the Vicar's Cairn.
H. nigrita, Fab.—Mullinure, Edenmore—not common.
H. pubescens, Gyll.—Mullinure—rare.
H. planus, F.—Mullinure—fairly common.
H. lituratus, F.—Mullinure—common.
Agabus paludosus, F.—Mullinure, Lowry's Lough—not common.
A. unguicularis, Thoms.—Mullinure, Lowry's Lough—not common.
A. biguttatus, Ol.—Mullinure—rare.
A. nebulosus, Forst.—Lowry's Lough, etc.—common.
A. sturnii, Gyll.—Common throughout district.
A. bipustulatus, L.—Common throughout district.
Ilybius fuliginosus, F. } Common throughout district.
I. ater, De G. }
I. obscurus, Marsh.—Mullinure—not common.
Rhantus exoletus, Forst.—Lowry's Lough, Mullinure.
R. notatus, Berg.—Lowry's Lough.
Colymbetes fuscus, L.—Common throughout district.
Dytiscus punctulatus, F.—Mullinure—not common.
D. marginalis, L.—Common throughout district.
D. circumcinctus, Ahr.—Mullinure, Lowry's Lough—not common.
Acilius sulcatus, L.—Lowry's Lough, Loughgall.
A. fasciatus, De G.—In a flax hole at Beech Hill.

GYRINIDÆ.

- Gyrinus minutus**, F.—Pond near railway in Drummanmore—not common.
G. bicolor, Payk.—Loughnashade, Drummanbeg Lake—rare.
G. natator, Scop.—Common throughout district.
G. marinus, Gyll.—Common throughout district.
Oreochilus villosus, Müller.—Dean's River—not common.

HYDROPHILIDÆ.

- Hydrobius fuscipes**, L.—Common throughout district.
Philhydrus testaceus, F.—Loughnashade, in moss from edge of drain—rare.
P. maritimus, Thoms.—Lowry's Lough—rare.
P. melanocephalus, Ol.—Lowry's Lough—rare.
Anacæna globulus, Payk. } Common throughout district.
A. limbata, F. }
Laccobius sinuatus, Mots.—Dean's River, Mullinure—pretty common.
L. alutaceus, Thoms.—Drummanbeg Lake, Mullinure, Loughnashade—pretty common.
L. minutus, L.—Lowry's Lough—not common.
L. bipunctatus, F.—Lowry's Lough, etc.—common.
Limnebius truncatellus, Thoms. } Mullinure, etc.—common.
L. papposus, Muls. }
L. nitidus, Marsh.—Drummanbeg Lake, Mullinure, in moss—not common.
Chætarthria siminulum, Herbst.—Loughnashade, in moss—not common.
Helophorus, nubilus, F.—Mullinure, in flood rubbish—also in drains.

- Helophorus aquaticus*, L. }
H. æneipennis, Thoms. } Common throughout district.
H. brevipalpis, Bedel. }
H. arvernicus, Muls.—Folly, Mullinure—not common.
Oethebius pygmæus, F. }
O. bicolon, Getin. } Common throughout district.
Hydræna riparia, Kug.—Mullinure, etc.—common.
H. nigrita, Germ.—Mullinure—not common.
Cyclonotum orbiculare, F.—Loughnashade, Mullinure, in moss—pretty common.
Sphæridium scarabæoides, F.—Common throughout district.
S. bipustulatum, Fab.—Near the Poor House—uncommon.
Cercyon depressum, Steph.—one specimen in Mullinure,
C. hæmorrhous, Gyll. }
C. hæmorrhoidalis, Herbst. } Common throughout district.
C. flavipes, F. }
C. lateralis, Marsh. }
C. melanocephalus, L.
C. unipunctatus, L.—Widely distributed, but not common.
C. pygmæus, Ill.—Mullinure, Dean's Hill—pretty common.
C. analis, Payk.—Lowry's Lough, etc.—common.
C. lugubris, Payk.—Lowry's Lough—rare.
C. minutus, Muls.—Mullinure—not common.
Megasternum boletophagum—Mullinure, etc.—common.
Cryptopleurum atomarium, Muls.—Common throughout district.

STAPHYLINIDÆ.

- Aleochara fuscipes*, F.—Mullinure, in dead bird—not common.
A. bipunctata, Ol.—Mullinure, in moss, etc.—not common.
A. cuniculorum, Kraatz—Mullinure, in moss—rare.
A. lanuginosa, Grav.—Common throughout district.
A. moesta, Grav.—Mullinure—rare.
A. nitida, Grav.—Mullinure, Killeen, in moss—pretty common.
Oxypoda opaca, Grav.—Mullinure, etc., in moss—fairly common.
O. umbrata, Grav.—Lowry's Lough, in moss—rare.
O. longiuscula, Er.—Common throughout district.
Ilyobates nigricollis, Payk.—A single specimen in my house.
Calodera æthiops, Grav.—Very rare.
Myrmedonia collaris, Payk.—Mullinure, in moss—rare.
Astilbus canaliculatus, F.—Common throughout district.
Alianta incana, Er.—Mullinure, sweeping; in stems of *Typha latifolia* in bog near Alistragh.
Homalota gregaria, Er.—Lowry's Lough, in moss—not common.
H. imbecilla, Wat.—Drummanbeg Lake, in moss—fairly common.
H. luteipes, Er.—Mullinure—rare.
H. luridipennis, Mann.—Mullinure, in flood rubbish—rare.
H. gyllenhali, Thoms.—Mullinure—rare.
H. elongatula, Grav.—Mullinure, Dean's Hill, in moss.
H. volans, Scriba.—Mullinure, in moss—rare.
H. oblongiuscula, Sharp.—Palace Demesne, in moss—rare.
H. vicina, Steph.—Common throughout district.
H. pagana, Er.—Palace Demesne, in moss—rare.
H. graminicola, Gyll.—Common throughout district.
H. circellaris, Grav.—Common throughout district.
H. elegantula, Bris.—Palace Demesne, in moss—rare.
H. analis, Grav.—Common throughout district.
H. aquatica, Thoms.—Near Grange, Mullinure—not common.
H. xanthoptera, Steph.—Palace Demesne, in moss—not common.

(TO BE CONTINUED.)

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Three monkeys have lately been purchased for the collections. Two of these—the Mandrill (*Cynocephalus maimon*) and the sooty Mangabey (*Cercocebus fuliginosus*)—are from Africa. The other species is the Barbigudo or “Nigger Monkey” (*Lagothrix humboldtii*), from South America.

Miss Wilson Patten has presented an Indian Mynah (*Acridotheres ginginianus*) to the Society.

The Aquarium has been placed by the Council under the supervision of Dr. R. F. Scharff, who will be assisted in the alterations to that department by M. Deniset, of Paris, who has given much attention to the culture of fish. A series of tanks will be arranged, showing the development of different species. The Aquarium has been enriched by donations of fish from Mr. Godden, and also by the purchase of a hundred gold-fish.

Over 4,000 persons visited the gardens in March.

DUBLIN MICROSCOPICAL CLUB.

MARCH 18th.—The Club met at Dr. R. F. Scharff's, who exhibited a cross-section through the body of a Gephyrean worm (*Priapulius caudatus*), to show the structure of the nerve cord. The latter is remarkable for the fact that it lies entirely in the outer body-layer or ectoderm, a condition which is extremely rare in an adult higher invertebrate. Animals generally pass through that stage in early life, but the nerve cord migrates further towards the interior of the body later on, and is generally found in connection with the mesoderm in the adult. The section showed the ectodermic cells actually merging into true ganglion cells, thus illustrating an instructive fact in the development of animal tissues.

Mr. G. H. Carpenter showed sections through the crop and gizzard of the cockroach (*Periplaneta orientalis*).

Professor G. A. J. Cole showed specimens of *Xanthidia*, discovered in the London clay of Sheppey by Mr. E. W. Wetherell, F.G.S., and kindly sent to the meeting by that gentleman. These minute globular bodies, with bifurcating processes, are capable of being stained in microscopic preparations. Hitherto they have been best known from sections of Cretaceous flints. It has been suggested that they were radiolarians; but they have been generally regarded as zygospores of desmids, a view which was supported in the discussion which followed the examination of these perfect specimens.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

APRIL 5th.—The President, PROF. FITZGERALD, in the Chair. Mr. Allan P. Swan read a paper on “Milk and its Ferments.” The reader pointed out that milk as secreted by a healthy animal is quite sterile, and that fermentation is entirely due to contact with the air, which is full of the spores of micro-organisms. He then went on to describe the Caucasian fermented milk-drinks of “Koumiss” and “Kiphir,” and showed their importance as articles of food to the wandering tribes who used them. The paper was illustrated by lantern slides, and by a microscopical demonstration.

ARMAGH NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 29th.—The President, REV. W. F. JOHNSON, M.A., in the Chair. Mr. R. Lloyd Praeger, M.R.I.A., read a paper entitled “A Deep-sea Dredging Expedition.” An account was given of the expedition sent out by the Royal Irish Academy in 1888 to explore the deep waters off the S.W. coast of Ireland. The appliances and theory of deep-sea dredging were first gone into, and a narrative of the cruise was then given. The

paper was illustrated by photographs, drawings, apparatus, and specimens.

APRIL, 11th.—The President in the Chair. Mr. E. L. Fischer read a paper on "Music Without and Within."

DUBLIN NATURALISTS' FIELD CLUB.

APRIL, 12th.—The President, Dr. E. J. McWEENEY, in the Chair. Prof. G. A. J. Cole, F.G.S., gave a paper on "The Geology of the Scalp and its Neighbourhood." The Scalp is believed by Prof. Cole to have been cut by a stream flowing southward from the high district which must formerly have existed to the north of the present granite ridge, before the Carboniferous beds had been removed by denudation. This explanation was given some years ago by Prof. Hull. The sands and gravels of Glencullen were also described and compared with similar features in Alpine valleys. The interesting question of the marine shells in these gravels at high levels was discussed. The paper was illustrated by views shown in the optical lantern. The concluding picture represented the supposed condition of the Dublin mountains as seen from the sea at the period of excavation of the Scalp, with glaciers and torrents flowing down their gorges from snowfields at an elevation of 7,500 feet. Rev. M. H. Close expressed his agreement with the views of Professors Hull and Cole as to the origin of the Scalp. He stated that the gravel-beds with marine shells high on the Two-Rock Mountain, described in his work on "The Glaciation of Ireland," had since been entirely cleared away. Mr. W. W. Watts thought that the amount of denudation previous to the glacial period must have been too great to allow at that time such a height for the Dublin mountains as Prof. Cole had suggested. Mr. J. J. Dowling also took part in the discussion. Prof. Cole stated that a new gravel-pit at a high level is now in course of excavation.

Mr. F. Neale sent for exhibition specimens of *Trochilium crabroniformis*, Cl., with larvæ and pupa cases (see note, p. 42) taken in the Co. Dublin. He also sent various species of Lepidoptera from the Limerick district, among which *Thecla rubi*, L., from Cratloe, Co. Clare, and *Smerinthus ocellatus*, L., were noteworthy.

Mr. G. H. Carpenter showed a female specimen of *Nyssia zonaria*, Schiff, from Achill Island (see p. 42); larvæ of *Cossus ligniperda*, L., found by Mr. Thomas Greene at Millbrook, Co. Kildare; and two species of Pycnogonida. One of these, *Phoxichilus spinosus*, Mont., from Dublin Bay, is new to the Irish coast, and the other, a *Nymphon*, from Ballina, appears to be new to science.—(See note, p. 42).

Mr. W. W. Watts asked members interested in photography to assist the committee appointed by the British Association for collecting photographs of geological features.

CORK NATURALISTS' FIELD CLUB.

APRIL, 1st.—The President, PROFESSOR HARTOG, D.Sc., F.L.S., in the Chair. The rules drafted by the Committee were passed after a few amendments. The names of W. J. Knight, LL.D., and F. Cotter, M.D., were added to the Vice-Presidents. The President then gave a discourse entitled "A Gossip on Pond Life," which unfortunately had to be curtailed. Having dealt with the various microscopic denizens of the ponds, streams, and stagnant water, he described their various forms, habits, and modes of propagation, and especially pointed out the vast field for research opened by the aid of the microscope. A discussion then took place as to the best mode of recording the work done by the Club.

APRIL, 8th.—The President in the Chair. The Right Rev. Dr. O'Sheehan, Bishop of Waterford, was unanimously elected a Vice-President, and Mr. R. A. Phillips was appointed Curator of the Society's proposed museum.

Miss H. A. Martin, M.R.C.P., gave a discourse on "Plant Life." Having explained, by the aid of diagrams and specimens, the structure

of plants in general and their classification, Miss Martin gave a graphic description of the flora to be seen in the woods and marshes in the neighbourhood. The President spoke on the use of the microscope in examining the different forms of minute fungi. Mr. O'Sullivan gave some interesting information as to the finding of *Spiranthes romanzoviana* in County Cork. An interesting discussion on plant-collecting and preserving then followed.

ROYAL IRISH ACADEMY.

APRIL, 11th.—Rev. Dr. S. Haughton, F.R.S., read papers on “Newtonian Chemistry” and “A Simple Account of Chemical Valency on Newtonian Principles.” Dr. W. Frazer read a paper “On the Bronze Instruments usually described as Sickles.” The Secretary communicated a paper by Dr. Parker, F.R.S., “On the Anatomy and Physiology of *Protopterus annectens*.”

NOTES.

BOTANY.

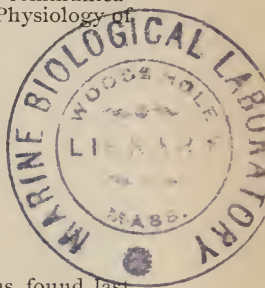
FERNS.

Trichomanes radicans IN CO. TYRONE. This plant was found last year by my brother, Mr. G. G. Delap, within five miles of Strabane. The locality faces almost west, and is shaded from the sun. There appeared to be three large tufts or plants within a small area.—Rev. Alex. H. Delap, Tamney, (in the *Journal of Botany* for April). This is a very important and decidedly unexpected addition to the flora of district 10 of “Cybele Hibernica.”

ANGIOSPERMS.

Carex aquatilis IN IRELAND. While botanizing along the banks of the river Main, in Shane's Castle park, in Co. Antrim, in June last, I came across a luxuriant growth of this plant in a ditch of standing water communicating with the river, about a mile and a half from where it flows into Lough Neagh. This sedge, which was formerly accounted of such extreme rarity in Britain, and which was first obtained in Ireland by Mr. S. A. Stewart, in 1883, in Co. Roscommon, is now added to the flora of district 12 of “Cybele Hibernica.” The plant grows very luxuriantly at the present station, the stems being three to four feet long, and the bracts one and a half to two feet in length. At the mouth of the stream, a mile and a half further down, I observed from the eastern bank an extensive grove of a large *Carex* on the opposite shore, which is very possibly the same plant, but had no opportunity of obtaining specimens of it. The station above-mentioned is, so far as I am aware, the lowest yet observed for *C. aquatilis* in Ireland, being only about forty-five feet above high tide level. The specimens were kindly determined for me by Mr. Arthur Bennett, F.L.S., who refers them to var. *clatior* Bab.—R. Lloyd Praeger.

Vaccinium vitis-idaea AT LOW LEVELS. Commenting on Mr. More's note on this subject in the *Journal of Botany* for March, Mr. S. A. Stewart writes in the April number of the same publication, that for thirteen years he has known the plant to grow in two stations at Rasharkin, Co. Antrim, one slightly above 500 feet elevation, the other slightly below 500 feet.



ZOOLOGY.

PYCNOGONIDA.

A NEW *Nymphon* AND *Phoxichilus spinosus* ON THE IRISH COAST. I received early in April from Miss A. Warren, of Moyview, Ballina, a fine adult male *Nymphon*, which was alive, and carried masses of eggs on its accessory limbs. The species appears to be new, and I will shortly describe and figure it.

After the violent S.E. gale of October, 1889, Dr. Scharff secured a number of Pycnogonida on seaweed thrown ashore at the North Bull, Dublin Bay. These prove to be *Phoxichilus spinosus*, Mont., a species which, I believe, has not yet been found in Irish waters. This interesting form has been dredged at moderate depths (ten to fifteen fathoms) off the coasts of Norway, North Wales, Devonshire, and France. A very nearly related species (*P. vulgaris*, Dohrn) is found in the Mediterranean. —G. H. Carpenter.

INSECTS.

COLEOPTERA AT HOLYWOOD, CO. DOWN. In December last year Dr. Scharff brought me two species of beetles from Cultra Wood, neither of which appear to have been taken by Rev. W. F. Johnson in January (pp. 18, 19). These are *Helophorus aquaticus* and *Silpha subrotundata*. —G. H. Carpenter.

Nyssia zonaria ON ACHILL ISLAND. A female of this very rare and local moth was found on the sandhills of Achill Island early in April by Mr. J. R. Sheridan, by whom it was sent to Mr. A. G. More, who kindly passed it on to me for the Museum collections. The only Irish locality hitherto known is Ballycastle, Co. Antrim, where Mr. Campbell took it in 1884 and Mr. Bristow in 1889. In Great Britain it occurs only on the sandhills of the Lancashire, Cheshire, and N. Wales coasts. —G. H. Carpenter.

Trochilium crabroniformis. This "clearwing," closely resembling a large wasp or hornet in appearance, seems to be common in Co. Dublin, if one may judge by the large number of poplar and willow trees in the stems of which the borings or tunnels of its larvæ may be seen. These gimlet-like holes are to be found at Portrairie, Malahide, Portmarnock, Howth, and Shankill, near the sea coast, and they also prevail largely inland at Terenure, Templeogue, and Crumlin, etc., being especially abundant in the neighbourhood of Jobstown and Swiftbrook. My attention was first directed to them in the spring of the year 1889, as causing the gradual destruction of some weeping willows at a gentleman's residence near Terenure. In April of the following year one of the willows looked so sickly, and had put on foliage so poorly the former season, that its owner decided to cut it down, and, through the kindness of his son, I secured two pieces of the stem, each some sixteen or eighteen inches long, literally riddled with old borings, and evidently containing living larvæ. I at once placed them in large flower-pots, covering one end to the depth of about one inch with earth, and securing the other to the rims of the pots with wires, so as to prevent their shaking or falling down. This was on the 24th of the month, and for the following six weeks or thereabouts the stumps stood in a window facing the west, and had water poured over them freely twice a-day, being partially screened, when deemed necessary, from the strong afternoon sunshine. From a horticultural point of view they looked very unpromising subjects indeed; but plainly they contained plenty of life, as from about fourteen different places *frass* was being constantly and abundantly ejected by the invisible larvæ. On the 9th of June, at about 8.30 a.m., my care and attention to the plantation were rewarded by the appearance of a fine imago at rest on one of the stumps, the empty and shattered pupa case lying on the surface of the clay, thus affording no clue as to the spot from whence the insect had come. From this date until the 3rd July some

ten others put in an appearance, all perfect in form and condition, and two more perished in the act of emerging, apparently owing to the mouths of their tunnels being too small for them to pass through. Hoping to secure specimens of *T. apiformis* from affected poplar trees, I searched for that species on three mornings between the hours of eight and nine o'clock in the latter days of June, but did not succeed in finding it, as, although I took four insects, they were all *T. crabroniformis*. This would seem to indicate that the same insect feeds on the two kinds of wood—viz., willow and poplar, indiscriminately, at least in Co. Dublin. I had great pleasure in giving some of my takings to interested friends whilst still fresh and unset, not knowing that I should lose several of those retained from grease, their bodies to all appearance, in some cases, becoming quite corrupt and breaking up. All, however, did not go this way, and I have successfully restored the beautiful black and bright yellow bandings on others by total immersion in *pure benzole* for a period of twenty-four hours. This remedy I tried by the advice of an English entomologist, who states that he has repeatedly used it with good effect on greasy insects of various kinds. I find borings, but not at all commonly, in this locality also, and have taken one specimen of *T. crabroniformis*.—Francis Neale, Limerick.

FISHES.

PIKE (*Esox lucius*) IN THE SHANNON. Some remarkably large pike have been killed in the Shannon, near Bannagher. One, shot by a Mr. McIntyre, weighed 55 lbs., and several caught by the local fishermen have exceeded 30 lbs.—*Land and Water*, April 2nd.

PIPE FISHES AT CORK AND KILLALA.—In the *Zoologist* for April Mr. R. Warren writes that he has often taken the Æquorial Pipe-fish (*Nerophis æquoreus*) and the Greater Pipe-fish (*Syngnathus acus*) when trawling in Cork harbour, and that he has procured the Lesser Pipe-fish (*Siphonostoma typhle*) in Killala Bay, the species having been determined by the late William Thompson.

LEPTOCEPHALUS LARVÆ OF CONGER AT KILLALA BAY.—Mr. R. Warren, in the *Zoologist* for April, also records the occurrence at Killala Bay of two examples of the strange larval form of the Conger, formerly known as *Leptocephalus morrisii*.

BIRDS.

BIRDS SINGING AT NIGHT. That there are a few species of birds which habitually sing after nightfall is a well-known fact. These are, however, chiefly summer visitors; but when some of the ordinary choristers of our woods break through their usual habit, and enliven the hours of midnight darkness with their song, it calls for some remark. On the night of February 9th last, about eight p.m., I heard a Blackbird chattering loudly in the demesne here (Hillsborough, Co. Down) among the trees near the edge of the lake. About half an hour after midnight, while I stood in the silent and deserted streets of the town, a perfect chorus of Blackbirds could be heard singing in the woods all round. Perhaps a dozen or more of their voices could be heard at once, some distant, some close by. Occasionally one or more of the singers would vary the performance by breaking out into the loud chattering alarm cry, as if laughing at the unusual effect of the concert in the silent midnight woods. The night was very mild, calm, and cloudy, though with a good deal of light, the moon being near the full. As long as I listened this peculiar concert was kept up. What makes this even more remarkable is, that at the time the Blackbird was only just beginning to tune the first notes of his spring song, even during the daytime. I did not hear the notes of any other species except the Blackbird.—Rev. Allan Ellison, Hillsborough, Co. Down.

THE TREE-CREEPER (*Certhia familiaris*) AS A SONG-BIRD.—Most of our writers on ornithology describe the Tree-creeper as a non-singing bird, asserting that it has but a single note—the shrill “cheep” which it utters now and then as it runs up the trunk of a tree or along a stout branch, sometimes giving forth a quick, hurried repetition of the same. I wonder how many of our ornithologists know that this is a mistake. The Tree-creeper is a song-bird, but, for various reasons, it is no wonder that the fact is not generally known. Firstly (writing from my own experience), the period during which the bird sings is very limited. I have never heard the song earlier than the end of March, nor later than the middle of May. Secondly, it sings very rarely, and usually early in the morning. Thirdly, the observer, on hearing the song, turns to the point from whence it came, and anxiously awaits for it to be repeated; but, as the bird will not sing again for some time, he grows tired of waiting, and passes on his way, ascribing what he has heard to the nearest Robin, this bird having some rolls which somewhat resemble the song of the Tree-creeper. It was the late Miss Massy, the discoverer of the Redstart as a breeding species in Ireland, who first drew my attention to the Tree-creeper's song. This lady being one of the most accurate observers of bird-life that I ever knew, I could not doubt her statement; so in the ensuing spring I spent a great deal of time, early and late, about the breeding haunts of the bird, and received abundant practical confirmation of her observations.—James Johnston, Novara, Bray.

WHOOPEE (*Cygnus musicus*) AND ROUGH-LEGGED BUZZARD (*Buteo lagopus*) IN CO. DONEGAL. A Whooper was shot at Horn Head, Co. Donegal, towards the end of October last, and during the last week of November a male Rough-legged Buzzard was killed at the same place.—H. Beecher (in the *Field*, March 12).

JAYS (*Garrulus glandarius*) IN COUNTY WESTMEATH. My friend, Mr. H. C. Levinge, tells me that his gamekeeper shot a jay, and saw another a few days ago at Knockdrin Castle. This is the first time that I have heard of the occurrence of the jay in County Westmeath.—A. G. More (in *Irish Sportsman*, March 12).

WHITE SNIPE (*Gallinago cœlestis*). In the *Irish Sportsman* for March 19th, Mr. Daniel Doddy records a perfectly White Snipe which he shot near Abbeyfeale, Co. Limerick, about a year ago. It had pinkish eyes and legs; the bill was of the normal colour.

REPORTED OCCURRENCE OF THE FERRUGINOUS DUCK (*Fuligula nyroca*) IN QUEEN'S COUNTY INCORRECT. In the *Field* for March 26th Mr. A. G. More writes that the Ferruginous Duck reported from Queen's County in the *Field* of January 30, turns out on examination to be a female Golden-eye (*Clangula glaucion*).

MAMMALS.

NEW VARIETY OF THE EXTINCT IRISH DEER (*Cervus giganteus*). In *Land and Water* for March 26 Mr. R. Lydekker describes and figures an interesting new variety of the Irish Deer, of which antlers have been recently obtained at Kottbus and near Worms. It differs from the type chiefly in the upward and forward (instead of outward horizontal) extension of the antlers, and in the position of the plane of the antlers, the anterior edge being twisted inward, so that the outer faces of the antlers are visible from the front, instead of the inner face, as in the type. The trez-tine is also much longer than in the normal form. Irish naturalists will do well to look out for this interesting form in their own country, which appears to have been the head-quarters of *Cervus giganteus*.

In *Land and Water* for April 16 an illustration is given of a fine pair of antlers of this species, eleven feet in span, and possessing a double trez-tine. The specimen was obtained somewhere in Ireland, but particulars are not forthcoming.

The Irish Naturalist.

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No. 3.

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

THE fact that Ireland possesses several species and many varieties of land and freshwater mollusca not found in Great Britain may justify my giving a more extended account of them than has hitherto been published.

A casual observer may not be acquainted with more than half a dozen different kinds of slugs and snails, and it requires most diligent search at different seasons of the year to obtain all the one hundred and eleven species which are now known to occur in Ireland. It should be remembered that on a country walk no stone should be left unturned.

Land shells may be collected at all times of the year, but the summer and autumn are the best seasons. As a rule, damp localities are the most likely to yield a rich harvest, though some species, like *Helix pisana*, *H. virgata*, and *H. ericetorum*, seem to prefer dry and grassy slopes. Most of the freshwater mollusca, such as all the *Planorbis*, and many of the *Limnææ*, live in stagnant or slowly-moving waters, and a very fine-meshed net will be useful in exploring ditches and ponds.

The external shell of the mollusca is so characteristic, and affords such excellent specific distinctions, that for the collector it is not necessary to retain the animal, which can be easily removed with a pin after the shell has been immersed in boiling water for a few minutes. The heat of the water not only kills the animal instantaneously, but relaxes the columellar muscle, by means of which the animal is fixed to the shell.

Having secured the shell and thoroughly cleaned it, I would urge on the collector the very great importance of recording the locality where the specimen has been taken. The principal maxim in fact is—*label your specimen with the name of the locality in which it was found*. The date of the capture may be useful too, but is not of such importance, and the scientific name of the animal can be added at any time.

Slugs, or mollusca without an external shell, are best preserved in spirits, as the small shell, which is in many forms found under the mantle in the head region, does not afford any very reliable mode of distinguishing the species.

The collecting of land and freshwater shells might be thought by some to be a rather aimless amusement, from which little scientific truth could be obtained, but it must be borne in mind that the vast majority of animal remains found fossil in rocks are shells, and that a good knowledge of recent forms will help us to identify the fossil ones. The age of rocks in different places is almost altogether determined by the nature of the fossils contained in them, and, by tracing certain species through a series of geological strata in a number of places, we are able to learn a good deal as to the origin of the species, and the cause of their present distribution.

One of the most instructive branches of natural history is the study of Geographical Distribution of Animals, and land and freshwater mollusca are particularly suitable to elucidate research in this direction, as their migration is very limited, and they are not transported so easily by accidental causes as many other kinds of animals.

In the preparation of this list of Irish land and freshwater mollusca, I have been very kindly assisted with specimens by Miss Warren, Mr. Praeger, Rev. A. H. Delap, Mr. Barrett-Hamilton, Mr. Ussher, Mr. Redding, Professor G. V. Hart, Mr. H. C. Hart, Miss Sidney Smith, Mr. F. W. Moore, and Mr. Garnett, while Mr. H. C. Levinge was good enough to allow me to collect in his extensive demesne.

The Roman figures under the heading of each species indicate the districts in Ireland in which specimens have been found. The districts, which are those adopted by Messrs. Moore and More in their well-known work the "*Cybele Hibernica*," are as follows:—

- I. Kerry and South Cork.
- II. North Cork, Waterford, South Tipperary.
- III. Kilkenny, Carlow, Queen's County.
- IV. Wexford and Wicklow.
- V. Kildare, Dublin, Meath, Louth.
- VI. Limerick, Clare, East Galway.
- VII. North Tipperary, King's County, Westmeath, Longford.
- VIII. West Galway, West Mayo.
- IX. East Mayo, Sligo, Leitrim.
- X. Fermanagh, Cavan, Monaghan, Tyrone, Armagh.
- XI. Donegal and City of Londonderry.
- XII. Down, Antrim, Derry.

The following is a list of the more important works and papers containing reference to the Irish molluscan fauna, which will be referred to in the text by their numbers:—

1. ALLMAN, G. A. "Description of a new Genus of Pulmonary Gastropod."—*Ann. and Mag. Nat. Hist.* xvii. 1846.
2. CLARKE, B. J. "On the Species of *Limax* found in Ireland."—*Ann. and Mag. Nat. Hist.* xii. 1843.
3. *Conchologist*, ii. (Notes on Irish Mollusca).
4. GOODSIR, JOHN. "An Account of the Anatomy of *Limnaeus involutus*, Harvey."—*Ann. Nat. Hist.* v. 1840.
5. "Guide to the County Dublin, its Geology, Industries, Flora and Fauna," 1878.
6. HOGAN, A. R. "Notes on the Land and Freshwater Mollusca of the County Dublin."—*Nat. Hist. Review*, i. 1854.
7. HUMPHREYS, J. D. "Contribution towards a Fauna and Flora of the County Cork, 1845.
8. JEFFREYS, J. G. "British Conchology," vol. i. 1862.
9. *Journal of Conchology*, i. to vi. (contains numerous notes and records on Irish mollusca.)
10. MILNE, J. G. "Contributions towards a list of Irish Mollusca."—*Journ. of Conchology*, vi. Jan. 1890.
11. MILNE, J. G. "Notes on the Land and Freshwater Mollusca of Achill Island."—*Journ. of Conchology*, vi. Oct. 1891.
12. REEVE, L. "Land and Freshwater Mollusca of the British Isles," 1863.
13. SCHARFF, R. F. "The Slugs of Ireland."—*Trans. R. Dub. Soc.* (2) iv. 1891.
14. TAYLOR AND ROEBUCK. "Materials towards a Land and Freshwater Molluscan Fauna of Ireland."—*Proceed. R. Irish Acad.* (2) iv. 1888.
15. THOMPSON, W. "Natural History of Ireland," iv. 1856.
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GASTROPODA.

P U L M O N A T A .

GENUS—**VITRINA**.

Vitrina pellucida, Müller.

— II. — IV. V. VI. VII. VIII. IX. X. — XII.

This species is fairly common in most parts of the mainland, and I recently found it also on the Aran Islands, Co. Galway. As a rule only dead shells are seen during summer, and it should be looked for during the winter months, when it is most active. Some of the specimens I have seen resembled *Vitrina Major*, Fér., which occurs in the south of France.

FOREIGN DISTRIBUTION.—Common in Great Britain. To judge from its distribution, it must be one of our oldest living land-shells, for it has also been found all over central and northern Europe, the Caucasus and Siberia, and very closely allied species live in North America and Greenland.

(TO BE CONTINUED).

CAREX AQUATILIS, WAHLB. AND ITS BRITISH FORMS.

BY ARTHUR BENNETT, F.L.S.

Carex aquatilis, though less variable than *C. salina*, yet presents many forms so closely related to each other as to be difficult to discriminate with anything like satisfaction. In the eleventh edition of Hartman's "Handbook of the Scandinavian Flora," Dr. Almquist gets over the difficulty by naming only one form, the var. *epigeios* Læstadius (not of Fries, which is a *salina* form). Anderssen, in his "Cyperaceæ Scandinaviæ" (1849), p. 46, has five varieties. Læstadius, in his "Bidrag i Torneå Lappmark," describes a "*C. arcuata*," which seems to be a sub-species of *aquatilis*, and may be the same as the "*C. aquatilis* var. *subacuta*" of the "Loca Parrellela" (1839); but I have seen no specimens of either.

Up to the eighth edition of Hooker and Arnott, some doubt seems to have been felt as to our plant being the same as Wahlenberg's, though Fries, in his "Nov. Flor. Suec." Mant. iii. p. 146 (1842), distinctly says "*C. aquatilis*, Hook. Brit., 4, p. 336, ex Grev.!" I have specimens gathered by Dr. Greville, which come somewhat between the extreme var. *elatior* and the var. *virescens* Ands.

In the first edition of his "Manual" (1843, p. 341), Babington has a var. *elatior*, "three to four feet high, glumes oblong, blunt, shorter than the fruit: in the valley near the bridge at Clova." In the second edition (1847) this disappears, and Professor Babington wrote me that he *then* considered it was not entitled to rank as a variety. Dr. Boswell Syme, in the third edition of "English Botany," vol. x. p. 113, 1870, re-names the same plant var. *Watsoni*, ignoring the former naming of Babington. In 1850 Mr. J. McLaren, in a paper read before the Botanical Society of Edinburgh, and published in the *Botanical Gazette* for 1851 (p. 23), makes three Scottish varieties, but gives no names to them. His var. γ is the *elatior* of Babington; his α seems to be the table-land form of Forfar and Aberdeen; his β I suspect to belong to *C. rigida*, and to be the plant mentioned by Syme from the Little Craigendahl and Lochnagar, and which is closely allied to *C. limula* Fr., and *C. rigida* v. *inferalpina*, Læst.

Mr. H. C. Watson, in "Topographical Botany," remarks that Dr. Boott was inclined to think that the lowland plant offered more differences than could well be allowed to a variety, and Dr. Boott contrasted it with the North American *C. stricta*, Lam. (*C. angustata*, Sm.). Certainly some of the Scottish specimens do much resemble some of the forms of the North American plant.

So lately as 1870 the species had only been found in four counties of Scotland: we now have it from twenty, as well as from Cheviot and Cardigan.

It certainly was a surprise when Mr. S. A. Stewart first sent me Irish specimens named as "*acuta* v. *gracilis*." I at once saw that they belonged to *aquatilis*, but desiring a better opinion than my own, I sent them to Dr. Almquist of Stockholm, who returned them marked as "*aquatilis* Wahl." Still more was I surprised when Mr. Scully sent the same species from Kerry; indeed, I have tried to see if it could not be separated from it.

Why *C. aquatilis* does not occur in Denmark, and along the Baltic Provinces of Germany, is to me a puzzle. It seems quite rare in Russia, "Ingria" = Ingermanland—the province in which St. Petersburg is situated. Cardigan and Kerry are much to the south of this, as well as the station of Livonia, on the Bay of Riga.

At present I wish to more particularly notice the Irish forms, leaving the Scotch ones for more extended notice hereafter. So far as what may be the type-form, all our plants seem smaller than the original plant of Wahlenberg; this being so, it seems rather odd to have a var. *elatior*, but this must be left for the present. So far as Britain is concerned, I have seen specimens of the following:—

C. aquatilis var. *cuspidata*, Læst. in *Vet. Atcad. Handl.* 1822, p. 339.

Among var. *elatior* on the Wick river in Caithness; in this the glumes are very long, and cuspidate.

C. aquatilis var. *elatior*, Bab.! *Man. Brit. Botany*, ed. 1, 1843, p. 341. Var. *watsoni*, Syme! *Eng. Botany*, vol. x., p. 113, 1870.

In many counties of Scotland, though careful comparison of some is yet needed.

In Ireland in Antrim! R. Lloyd Praeger. Roscommon! S. A. Stewart.

Mr. Scully's Kerry specimens are, so far as size is concerned, about half-way between this and the Clova table-land specimens; the spikes, however, are as stout as in this, not thin and interrupted at the base as in the Clova plant.

C. aquatilis var. *virescens*, Anderssen in *Cyperaceæ Scandinaviæ*, 1849, p. 46.

Perthshire! Dr. B. White. Characterised by its very short (half the length of the fruit) and obtuse glumes, and regularly-arranged spikes. I cannot distinguish from this (the Scottish specimens were verified by Dr. Almquist) the plant gathered by Mr. H. C. Hart at Doochary Bridge, County Donegal, in 1886.

C. aquatilis var. *epigeios*, Læstadius, 1822. Mid-Perth! Dr. B. White. Dr. Almquist has written against this "*β epigeios* Læst. f. videtur."

A plant in habit somewhat like this, was gathered by Mr. R. M. Barrington at Temple Island, Inner Lough Ree, County Westmeath, in 1885, but it has the fruit distinctly ribbed or nerved. It was named by Dr. Lange of Copenhagen "*Carex turfosa* Fries f. *elongata*."

Among my numerous Scotch specimens are some which resemble the var. *flavicans* Nylander, "*Spicel. Fl. Fennicæ*," but I have seen no specimens of Nylander's plant. Besides

these forms, Anderssen has a var. *sphagnophila*, Fries from sub-alpine Lapland.

Beyond Europe the true plant is rare. I have it from Siberia, Canada, and United States; though many of the plants so named from the States are decidedly wrongly referred, and require careful and extensive comparison and study, as the forms do in Britain.

THE BIRDS OF RATHLIN ISLAND, CO. ANTRIM.

BY ROBERT PATTERSON, M.B.O.U.

THE nearest point of Rathlin is about three miles from Fair Head, but the distance from the quay at Ballycastle to the landing-place in Church bay, is seven and a-half miles. The island is five and a-half English miles long from the Bull, or western point, to Bruce's Castle, on the extreme east, and upwards of four miles from Rue Point, the most southerly, to Altacarry, at the north-east extremity. The greatest breadth at any part is one and a-quarter miles, and the narrowest half a mile, while the highest point is 447 feet above sea level. The cliffs on the northern and western sides are extremely precipitous, the average elevation of the island being about 200 feet. Rathlin has an area of 3,200 acres, only a small portion of which is under cultivation, the rest consisting of undulating rocky heaths with frequent marshes, and four lakes, the largest (Lough Ushet) covering thirty English acres. For much of the following information I am indebted to the late owners of the island, Robert Gage, Esq., and Miss Gage, whose recent deaths are much deplored by Irish naturalists. My own notes, taken on the island, have been consulted, and, of course, Thompson's "Birds of Ireland." Dr. J. D. Marshall's paper on the statistics and natural history of the island, (*Proceedings Royal Irish Academy*, 1836), and Mr. A. G. More's "List of Irish Birds," have been referred to. I have also taken some information from the "Reports on the Migration of Birds" (1881-1887), and have to thank Mr. R. J. Ussher for drawing my attention to an article in the *Zoologist* for 1867, by Mr. Howard Saunders, describing a visit he paid to the island. I am aware that Mr. Gage published a list of the birds of Rathlin in the *Proceedings of the Dublin Natural History Society*, but I have not been able to refer to it.

The species that are known to breed in Rathlin are marked with an asterisk (*).

**Turdus viscivorus*, L.—MISTLE-THRUSH. Resident all the year; it breeds regularly, generally in the bare fork of a tree.

**Turdus musicus*, L.—SONG-THRUSH. Common; breeds in all the gardens, more numerous about Church bay than elsewhere.

- Turdus iliacus**, L.—REDWING. Frequent in winter.
- Turdus pilaris**, L.—FIELDFARE. Not so common as last.
- ***Turdus merula**, L.—BLACKBIRD. Common in the gardens and hedges, where it breeds.
- Turdus torquatus**, L.—RING-OUZEL. The only specimen ever seen was shot, 18th April, 1883, by one of the light-keepers (Migration Report for 1883).
- ***Saxicola oenanthe**, L.—WHEAT-EAR. Very common during the summer, generally breeds in crevices of rocks and walls; earliest date of arrival, March 8th. I found it extremely abundant in June.
- ***Pratincola rubicola**, L.—STONECHAT. Frequently seen; nests generally among the whins.
- ***Erithacus rubecula**, L.—ROBIN. Dr. Marshall states that the Robin is rare, while Mr. Gage characterises it as common in the gardens and low bushy places, where it breeds. In 1889 I observed several young Robins, but did not see a single adult during three days.
- Sylvia cinerea**, Bechst.—WHITETHROAT. A regular summer visitant to the gardens, but the nest has not yet been found. I have no doubt it breeds.
- Regulus cristatus**, Koch.—GOLDEN-CRESTED WREN. A constant spring visitor, being frequently taken at the lighthouse on migration; it never remains on the island.
- Phylloscopus rufus**, Bechst.—CHIFFCHAFF. An occasional visitor to the gardens. One was taken on an apple tree in March, 1862. It has never been known to breed.
- Phylloscopus trochilus**, L.—WILLOW-WREN. Rarely seen; one was caught alive near the lighthouse, and another found in Mr. Gage's garden in April, 1867.
- Acrocephalus phragmitis**, Bechst.—SEDGE-WARBLER. This was the only bird I was able to add to Mr. Gage's list. I saw and heard the bird at Alley Lough, 2nd June, 1889. In October, 1891, a second example was killed by a Kestrel, and brought to Miss Gage.
- ***Accentor modularis**, L.—HEDGE-SPARROW. Common in the hedges and whins where it breeds. An albino young bird was once found beside the nest.
- Parus major**, L.—GREAT-TIT. An occasional visitor. One was taken in January, 1862, in Mr. Gage's garden, others have been seen at intervals.
- Parus cœruleus**, L.—BLUE-TIT. Occasionally seen; one was found dead in the garden in 1891.
- ***Troglodytes parvulus**, Koch.—WREN. Very common and resident, generally builds in ivy. Often observed on migration.
- Certhia familiaris**, L.—TREE-CREEPER. Once seen running along the garden wall, when it was shot. There are scarcely any trees on Rathlin.
- ***Motacilla lugubris**, Temm.—PIED WAGTAIL. Common all the year, breeds generally in holes in banks.
- Motacilla melanope**, Pallas.—GREY WAGTAIL. Uncommon; one was caught alive in the summer of 1858, having flown into one of the rooms through an open window. I have reason to think they breed, as I found a pair at Alley Lough, in June 1889, whose movements were suspicious, but I failed to find the nest.
- ***Anthus pratensis**, L.—MEADOW-PIBIT. Not uncommon; some nests with eggs have been found on some of the heath-covered hills, chiefly in the centre of the island. Several birds were found dead in the hard frost of January, 1867.
- ***Anthus obscurus**, Latham.—ROCK-PIBIT. Common along the shore. Nests have been found in the heaps of dried seaweed stacked for making kelp.
- ***Muscicapa grisola**, L.—SPOTTED FLYCATCHER. Is usually seen in summer, but the nest was never found till June, 1890, when a pair had a nest in a rose-tree against the wall of a greenhouse. The hen was very fearless.

- ***Hirundo rustica**, L.—SWALLOW. Common in summer; builds in outhouses and sheds. I observed it only about Mr. Gage's house and over the lakes. Has been seen on the 18th April (Migration Report, 1885).
- ***Chelidon urbica**, L.—HOUSE-MARTIN. Very common in summer, more numerous than the last; builds in the White Rocks at the north side of Church bay, in company with the Swift.
- ***Ligurinus chloris**, L.—GREENFINCH. Numerous in winter; a nest was found for the first time in May, 1885.
- Carduelis elegans**, Stephens.—GOLDFINCH. A winter visitor. Formerly, when brambles and wild roses were more plentiful, they bred regularly.
- ***Passer domesticus**, L.—HOUSE-SPARROW. Common at all the farm-houses. I noticed that all I saw were distinctly lighter in colour and appeared also smaller than those on the mainland.
- Fringilla cœlebs**, L.—CHAFFINCH. A few have been occasionally seen in the garden, but they have not been known to breed; chiefly seen in winter. I did not observe any in the month of June.
- ***Acanthis cannabina**, L.—LINNET. Common in summer and winter; it breeds in low bushes and whins. Frequently observed by the light-keepers on migration.
[Mr. Howard Saunders, in the article referred to, mentions the Lesser Redpoll, **Acanthis rufescens**, Vieillot, as breeding on the island, but Mr. Gage states it is quite unknown.]
- ***Acanthis flavirostris**, L.—TWITE. Fairly common all over the island, breeding in the higher ground. Mr. Howard Saunders found the nest on the ledge of a high cliff.
- ***Emberiza miliaria**, L.—CORN-BUNTING. Common and permanently resident; breeds in suitable localities.
- ***Emberiza citrinella**, L.—YELLOW-BUNTING. More numerous than the last, and resident. Nests frequently found.
- ***Emberiza schœniclus**, L.—REED-BUNTING. Common in the bogs throughout the island, where it breeds.
- Plectrophenax nivalis**, L.—SNOW-BUNTING. A regular winter visitant, sometimes in large flocks. Frequently seen on migration, as the following notes from the *Reports* will show:—"May 16th, shot a bird very like a Snow-bunting. October 14th, thirty. Some seen also on 15th, 17th, and 18th (October, 1883). October 16th, ten at noon, remain (1884). March 10th, one seen. September 6th, five going S."
- ***Sturnus vulgaris**, L.—STARLING. Very common; it breeds in clefts of rocks, chiefly in the neighbourhood of Church bay. Large flocks frequently observed on migration.
- ***Pyrrhocorax graculus**, L.—CHOUGH. Very common all over the island, they breed in the cliffs, chiefly at the White Rocks. Called "Jackdaw" by the natives.
- ***Pica rustica**, Scop.—MAGPIE. Not so frequently seen as formerly. They used to build in a clump of trees near Mr. Gage's house, but on some sportsmen shooting into the nests, they took to the rocks, where a few pairs still breed.
- Corvus monedula**, L.—JACKDAW. Rarely seen; occasionally comes from mainland.
- ***Corvus corax**, L.—RAVEN. One or two pairs breed in the most inaccessible cliffs on the north side of the island; formerly they were much more numerous, and were very destructive to young lambs, etc. One bird was seen to pick the eyes out of a ewe just after lambing, and was shot by the shepherd. The latter—a very observant man—states that every year, as soon as the young birds were able to fly and procure their own food, the old birds regularly drove them away from the place. Both old and young birds would disappear from the island for four or five days, and then the old birds would return alone. In May, 1867, a singular fight between Peregrines and Ravens occurred. Both birds had nests at no great distance from each other, on a very in-

accessible cliff. The Peregrine's eggs were wanted by a collector, and some boys, watching the birds away from the nest, went down on a rope, and took the eggs. The birds on their return, finding their nests empty, attacked the Ravens, killed the hen, and demolished the nest. The cock Raven fought fiercely, but was at last overcome by the Peregrines, who forsook that particular locality, and never returned. Up to this time both families had lived in apparent friendship, not interfering with each other, but it was evident the Ravens were blamed for the theft. The fight was witnessed from the top of the cliffs by many who were attracted by the cries of the birds, and they described it as being most bloody and determined.

***Corvus cornix**, L.—HOODED CROW. Very common; frequents the beach of Church bay and elsewhere. Breeds in the cliffs.

Corvus frugilegus, L.—ROOK. Young and old birds sometimes seen in autumn and winter. Observed by light-keepers on migration.

(TO BE CONTINUED.)

COUNTY DUBLIN, PAST AND PRESENT.

BY PROF. GRENVILLE A. J. COLE, F.G.S.

(Continued from page 36.)

III.—THE GRANITE CHAIN.

THE remarkable volcanic activity at the close of the Ordovician period was the herald, in Ireland, of great changes in the relations of sea and land. The shocks of earthquake and the fierce explosions from volcanic isles were in reality minor matters compared to the slow uplifting of the sea-floor, the bending and contortion of the Ordovician shales and limestones (fig. 4, p. 32), and the formation of the great chain of hills which even to-day forms the S.E. frontier of the country. We are only slowly beginning to understand the causes of these wide earth-movements; suffice it that, after the conversion of a great part of the area of the British Isles into dry land, and the consequent excavation of its surface by rain and rivers, the sea was again allowed to flow in over England, Wales, and western Ireland, depositing strata known as the Silurian system. But in Co. Dublin the elevation seems to have been more permanent; along an axis stretching far into the south, the strata formed a sort of arch, their upheaval allowing of molten rock to ooze up from lower levels of the earth's crust, following, inch by inch, the upthrust of the beds, and finally consolidating beneath them as a dense and crystalline mass.

How far this once molten rock extends beneath the present surface it is quite impossible to say; but denudation has already reached down to it through its former Ordovician covering at such outlying points as Rockabill¹ on the north

¹ First noted by Mr. C. W. Hamilton in 1840, see *G. S. D.* ii., 138.

and Carnsore Point on the south; while it is exposed continuously over the granite highlands which rise from the sea at Killiney, and stretch for 70 miles into the counties of Wexford and Kilkenny.

At Killiney the true character of this granite is excellently shown. On the shore below the steep face of Victoria Park the pale crystalline rock may be seen intruded in dykes and veins into the upturned and crumpled Ordovician shales. The junction is thus quite irregular; the hot rock has oozed into the sediments and has baked them, developing new minerals at the contact. Stellar groups of dark Andalusite have thus arisen by the driving off of the water from the substance of the clays and the crystallisation of the silicate of alumina; silvery mica covers all the planes of separation of the rock, but weathers away more rapidly than the andalusite, the latter standing out upon the surfaces in knots and bars. These products of contact metamorphism run through the mass in bands, which probably represent original layers of stratification; while some beds, on the other hand, seem but little altered. The granite itself has again and again a banded streaky structure, indicative of viscid flow along its junction with the older rock; as it began to consolidate, shrinkage-cracks, and joints due to "settlement" of its foundations, opened through it, and portions of the still fluid material from below were forced up into these spaces, forming a network of parallel-sided veins. Examination of the exposures about Kingstown and Killiney will show how some of these veins have been themselves cracked through, and often shifted on one side or other of the joint, still later material having finally recemented the mass. Some of the granite forming these subsequent veins is more coarse in grain than the surrounding granite; in others it is so finely grained that it is difficult to distinguish the constituent minerals, the rock being then properly called a Eurite. But in all these types of granite the fundamental minerals are the same, whether we investigate our samples with the unaided eye or with the microscope. Quartz, glassy and unscratched by the knife; Orthoclase felspar,¹ pale pink-brown, yellow-brown, or white, with surfaces of regular cleavage; and the micas, easily scratched, flaky, shining like silver, or deep brown-black when richer in magnesia and iron²—these are the essentials, though their proportions may vary from point to point. The old term granite is restricted to crystalline rocks, once molten, rich in silica and alkalies; the excess of silica is shown by the

¹ Chemical proof of the prevalence of this potash-felspar in the Dublin granite was first given by Apjohn, *Proc. R. Irish Acad.*, v. (1853), p. 381; Galbraith followed with numerous analyses, *ibid.*, vi., 134.

² Houghton, *Proc. R. Irish Acad.*, vi., 176, and *Quart. Journ. Geol. Soc.*, London, xv., 129.

abundance of quartz which, when the rock decays away, goes to form sand in the river-valleys and on the shore.

Other minerals are known in the granite of the Dublin Mountains,¹ and a second species of felspar is practically always present, ranging from Albite,² as highly silicated as orthoclase, but with soda in place of potash, to Oligoclase,³ the soda-lime felspar. For references to many previous papers and for an admirable series of investigations into the characters of the Dublin granite, the reader must turn to the memoir by Prof. Sollas just cited, which is at present the text-book of the subject. We must content ourselves with quoting Dr. Haughton's⁴ average analysis of (A) eleven specimens taken at intervals along the Leinster chain, and his deduction (B) as to the mean mineral constitution of the rock, in parts by weight.

A				B			
Silica	..	..	72.07	Quartz	..	..	32.57
Alumina	..	..	14.81	Orthoclase	..	..	15.44
Iron peroxide	..	..	2.25	Albite	..	..	22.10
Lime	..	..	1.63	Margarodite [White Mica]			19.16
Magnesia	..	..	0.33	Lepidomelane [Dark Mica]			5.81
Potash	..	..	5.11	Paste (Silicate of Lime)			4.92
Soda	..	..	2.79				
Loss by ignition	..	..	1.09				
			100.08				100.00

The orthoclase, as the lightest mineral in the rock, naturally plays a much greater part in the total volume than the 15½ per cent. assigned to it in the above mode of calculation. If the lime of the so called "paste" were present as a constituent of oligoclase felspar, a slight readjustment of the figures would be necessary.

The chemical constituents of these minerals were clearly once fused together; on the cooling of the intrusive mass, the micas separated out first, then the felspars, and finally the residual silica, as quartz. But experiment shows that this complete and often coarse crystallisation is only possible under pressure of overlying rocks and very slow conditions of cooling. When the materials of a granite are erupted at the surface as a molten lava, they cool as a black glass, Obsidian, with bands and patches of imperfectly developed crystals; such products are well known in Lipari and in Iceland. But in Co. Dublin the molten rock appears nowhere to have reached the

¹ Weaver, *Trans. Geol. Soc. London*, v. (1819), 135; Galbraith "On Killinite," *G. S. D.*, vi., 165; Haughton "The Mineralogy of the Counties of Dublin and Wicklow," *G. S. I.*, v., 43; O'Reilly, "On Microcline Feldspar in the Dalkey Granites," *ibid.*, v., 189; O'Reilly, "On Beryl in Glencullen," *ibid.*, vii., 69; Joly, "Beryl and Iolite of Glencullen," *Proc. R. Dublin Soc.* (new series), v., 48.

² Haughton, "Albite in the Granite of Dalkey," *G. S. I.*, ii., 213.

³ Sollas, "Contributions to a knowledge of the Granite of Leinster," *Trans. R. Irish Acad.*, xxix. (1891), 452.

G. S. I., v. (1878), pp. 41 and 43.

surface; it cooled down through, not days or months, but centuries; and the crest of the long Leinster ridge was no doubt originally formed of upheaved Ordovicians, giving a wilder and more broken aspect to the mountains than they wear at present. The last phases of earth-movement and "igneous" action are to be seen in the veins of pure quartz which occasionally cut the granite; these no doubt represent the courses of hot waters containing silica in solution, as in modern geysers, which circulated, decomposing some minerals and constructing others, during the final consolidation of the chain.

The broad tabular joints of granite, and still more its uniform powdery mode of disintegration, give us to-day the familiar long sweeping outlines of the Dublin hills. Occasionally, as on Three Rock Mountain, more resisting blocks protrude above the general surface of decay, like the "tors" of Devonshire; and the slopes are strewn with masses broken

Fig. 6.



Granite in the Dingle, near Carrickmines, showing how the rock becomes broken up into loose blocks by the widening of its joints. The face exposed, 30 ft. high, is formed by one of a series of joints parallel to the trend of the valley. (From a photograph by Prof. Haddon and Mr. J. McNab.)

from them or from others which have long since disappeared, by the action of frost or the slow widening of their joints (see *fig. 6*). The ridge from the head of Glencullen to Two Rock Mountain gives admirable lessons in the mode of weathering of the rock, the decomposition of the felspar setting free the quartz and mica, and a sort of sand thus spreading around each boulder into the black vegetable soil.

The contrast of outline between the granite background and the sedimentary masses of the Sugarloaves, or the easily denuded Carboniferous on which Dublin city stands, is well known to all who have crossed from Holyhead.¹ But to those who explore the glens and passes, traversed now by some of the highest roadways of the British Isles, the characteristic features of the granite will reveal themselves at all points, and with a breadth and a variety that custom never stales.

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A., F.E.S.

(Continued from page 38.)

STAPHYLINIDÆ.

Homalota trinotata, Kr.—Lowry's Lough, in moss, I also took a specimen on the top of the tower of the Cathedral.

H. nigricornis, Thoms.—Mullinure—rare.

H. corvina, Thoms.—Mullinure—rare.

H. atomaria, Kr.—Mullinure, in moss—not common.

H. sericea, Muls.—Dean's Hill—not common.

H. atricolor, Sharp.—Palace Demesne, Drummanbeg Lake, Mullinure.

H. nigra, Kr.—Mullinure—not common.

H. atramentaria, Gyll.—Mullinure—not common.

H. sordida, Marsh.—Lowry's Lough, Mullinure—not common.

H. aterrima, Grav.—Common throughout district.

H. pygmæa, Grav.—Lowry's Lough, in moss—rare.

H. muscorum, Bris.—Mullinure—rare.

H. laticollis, Steph.—Mullinure, in moss—not common.

H. fungi, Grav.—Common throughout district.

H. clientula, Er.—Lowry's Lough, in moss—not common.

Tachyusa umbratica, Er.—Lowry's Lough, Drumbee, Mullinure—pretty common.

T. atra, Grav.—Mullinure, in moss—not common.

Falagria obscura, Grav.—Common throughout district.

Autalia rivularis, Grav.—Lowry's Lough, in moss.

Eucephalus complicans, Westw.—Palace Demesne, Mullinure, Little Castledillon, in moss and in nest of *Myrmica*.

Gyrophæna lævipennis, Kr. Palace Demesne, in moss—not common.

Myllæna dubia, Grav.—Loughnashade, Grange, in moss—not common.

M. intermedia, Er.—Lowry's Lough, Drummanmore, in moss—not common.

M. minuta, Grav.—Lowry's Lough, in moss—not common.

¹ See also Weaver's drawings, *Trans. Geol. Soc. London*, 1st ser., v., pl. 8.

- Myllæna brevicornis**, Matth.—Mullinure, in moss—scarce.
Hypocyrtus ovulum, Heer.—Common in moss.
Conosoma pubescens, Grav.—Folly, in moss—rare.
C. lividum, Er.—Common throughout district.
Tachyporus obtusus, L.—Mullinure, Folly, in moss.
 var. **nitidicollis**, Steph.—common in moss.
T. solutus, Er.—Mullinure, Little Castledillon, in moss—not common.
T. chrysomelinus, L. }
T. humerosus, Er. } Common throughout district.
T. hypnorum, F. }
T. pusillus, Grav.—Dean's Hill, Mullinure, in moss—not common.
T. brunneus, F.—Lowry's Lough, etc.,—common.
T. transversalis, Grav.—Mullinure, Little Castledillon, in moss—not common.
Tachinus rufipes, L.—Common throughout district.
T. subterraneus, L.—Tyross, in Cathedral Grammar School playground ; flew to light in my kitchen.
T. marginellus, F. }
T. laticollis, Grav. } Common in moss.
Megacronus cingulatus, Mann.—Mullinure, Drummanmore, in moss—not plentiful.
M. analis, Payk.—Mullinure, Killooney, banks of Butterwater, in moss—not common.
Bolitobius lunulatus, L. }
B. trinotatus, Er. } All occur freely in moss and fungi, the
B. exoletus, Er. } last being the least abundant.
B. pygmaeus, F. }
Mycetoporus lucidus, Er.—Mullinure, in moss—rare.
M. longulus, Mann. }
M. splendidus, Grav. } Lowry's Lough, etc., in moss—fairly common.
Quedius mesomelinus, Marsh.—Cathedral Grammar School playground—not common.
Q. fulgidus, F.—Palace stables—in my garden—rare.
Q. cinctus, Payk.—Dean's Hill, Palace Demesne—not common.
Q. fuliginosus, Grav. }
Q. tristis, Grav. } Common throughout district.
Q. molochinus, Grav. }
Q. fumatus, Steph.—Mullinure, in moss—one specimen.
Q. auricomus, Kies.—Palace Demesne, in moss—rare.
Q. rufipes, Grav.—Drummanmore Lake, Mullinure, in moss—pretty common.
Q. attenuatus, Gyll.—Palace Demesne, in moss—rare.
Q. semianæus, Steph.—Common throughout district.
Staphylinus pubescens, De G. }
S. erythropterus, L. } Common throughout district.
S. casarius, Ceder.—Lowry's Lough, under stones, common on edge of lake.
Ocypus olens, Mull. }
O. cupreus, Rossi. } Common throughout district.
O. ater, Grav.—Drummanbeg Lake, one specimen.
Philonthus splendens, F.—Dean's Hill, Edenmore, in carrion, etc., pretty common.
P. intermedius, Boisd.—Palace Demesne, not common.
P. laminatus, Creutz.—Mullinure, Palace Demesne, etc., common.
P. succicola, Thoms.—One specimen near the Cathedral.
P. politus, F.—Common throughout district.
P. varius, Gyll.—Rookford, Mullinure, not common.
P. marginatus, F.—Common throughout district.
P. umbratilis, Grav.—Lowry's Lough under stones, Drummanbeg Lake.
P. cephalotes, Grav.—Lowry's Lough, Mullinure, Drummanmore Lake, pretty common.

- P. fimetarius**, Grav.—Lowry's Lough, Palace Demesne—not common.
P. sanguinolentus, Grav.—Mullinure, not common.
P. varians, Payk.—Common throughout district.
P. ventralis, Grav.—Beech Hill, Mullinure, not common.
P. discoideus, Grav.—In a hotbed in garden of H. M. Prison, Armagh.
P. quisquiliarius, Gyll.—Lowry's Lough, Loughnashade, Mullinure.
 var. **dimidiatus**, Steph.—Lowry's Lough, under stones on edge of lake, not common.
P. nigrita, Nord.—Lowry's Lough, Mullinure, common.
P. micans, Grav.—Mullinure, Drummanbeg Lake, not common.
P. trossulus, Nord.—Common throughout district.
P. puella, Nord.—Palace Demesne, Folly, not common.

(TO BE CONTINUED.)

REVIEW.

Harrow Birds. By G. E. H. BARRETT-HAMILTON. Harrow: sold by J. C. Willbee, for the Harrow School Scientific Society.

IN a convenient and well-printed little book of fifty pages, our youthful author has given a most interesting list of a hundred and ninety-eight Birds which have been ascertained to occur in the neighbourhood of Harrow School. Of these, to quote from the Preface, "Fifty-five are partially or wholly resident, twenty-seven are regular summer visitors, about twenty-two appear annually on migration, or in winter, and the remaining ninety-four are visitors of rare or accidental occurrence. The species which breed regularly number eighty-two."

To an Irish ornithologist, the most interesting species will be those which do not occur at all in Ireland. Such are the Dartford Warbler, Nuthatch, Tree Pipit, and Cirl-bunting, all of which are indicated as *breeding* in the small district contained within a radius of five miles round Harrow. The Whinchat, Redstart, Garden Warbler, Woodwren, Nightingale, Lesser Whitethroat, Reed-warbler, Marsh Titmouse, Red-backed Shrike, Hawfinch, Carrion Crow, Woodlark, Wryneck, three Woodpeckers, Stock Dove and Turtle Dove, all very rare in Ireland, are given as breeding, most of them regularly, in the vicinity of Harrow. And if, as long ago suggested by Swainson, we accept the small warblers as the birds most characteristic of a fauna, there are here enough to show how widely even so small a district as Harrow differs from any similar locality that might be selected in any part of Ireland. The County of Middlesex is very favourably situated, both on account of its proximity to the European Continent, and being in the south-east of England, it no doubt receives a larger number of the summer migrants. The fauna of Middlesex is a rich one, even for England, and it has been thoroughly explored by many competent observers, among whom we are glad to include Mr. Barrett-Hamilton, who, in this little book, has shown himself to be also an excellent compiler. Relying chiefly on Mr. Harting's well-known work, the "Birds of Middlesex," our author has added many useful observations of his own, and he has been fortunate in finding several correspondents as much interested in ornithology as himself. He has thus been enabled to draw up what might be called quite a model list, well arranged, well digested, and most admirably printed. The breeding Birds are distinguished by an asterisk, which enables the reader at once to pick out the species most important in the fauna, and we have no doubt that this little book, besides being very useful to the members of Harrow School, will be perused with interest by many more general readers, especially by those who are elsewhere engaged in drawing up local catalogues, and we hope that some of the other large public schools will follow the example which has been so well set by Harrow.

A. G. M.

NOTES.

BOTANY.

FUNGI.

FUNGI FROM CENTRAL IRELAND. On a recent excursion (April 23) to Knockdrin Castle, Co. Westmeath, the grounds of which were entered by kind permission of H. C. Levinge, Esq., I found the following species, as well as many others not yet named:—*Ecidiium primulae*, D.C.; *Peridermium pini*, Chev., now known to be a stage of *Coleosporium senecionis*, Pers.—the spermogonia were not seen; *Puccinia graveolens*, Pers., uredo stage on *Carduus arvensis*; *P. pimpinellae*, Strauss, uredospores on *P. saxifraga*; *Trichia serotina*, Schrad; *T. chrysosperma*, D.C., with *Stilbum tomentosum*, parasitic on the fructifications; two species of *Nectria*; *Peziza nivea*, Fr.; several species of *Diatrype* and *Sphaeria*; and *Dactylium roscum*, Berk, the spores of which differ from those of Berkeley's plant in being tri-septate; it causes a wide-spread bright pink discolouration of the wood. No agaric was found.

A sample of water from a ditch near the canal, besides containing numerous specimens of *Daphnia*, *Cyclops*, and red water-mites, contained six species of Schizomycetes, which were isolated by Koch's method. One of them proved to be *Bacillus fluorescens-liquefaciens*. The others require further study before it can be ascertained if they have been previously described.—E. J. M'Weeney, Dublin.

LIVERWORTS.

Diplophyllum obtusifolium (Hook), IN CO. DUBLIN. In the spring of 1890, when collecting cryptogams with the Dublin Naturalists' Field Club, on one of their excursions, I found a small patch of this rare liverwort growing on a moist clay bank in Glendhu, Co. Dublin. The only localities known for it in Ireland were near Bantry, Co. Cork, Miss Hutchins (1812); Dunscombe's Wood, in the same county, W. Wilson, Esq. (1829), and near Dunkerron, Dr. Taylor.

Dr. D. Moore, in describing the plant in his work on the Irish Hepaticæ, *Proc. R. I. A.* (2) ii. Science, writes:—"Very rare in Ireland. The localities quoted are the only places where it has hitherto been observed." It is interesting to note that it should now appear in the eastern part of Ireland, after such a long interval. I am not aware that it has been found by any other person since the dates above quoted. Another species, *D. albicans*, small forms of which might possibly be mistaken for it, is one of the commonest of all the liverworts, but it is also a most interesting plant. *D. obtusifolium* differs from it in its smaller size, and above all, in wanting the pellucid central nerve-like markings in the leaves, which character is not possessed by any other foliose liverwort. It is figured in Sir W. J. Hooker's "British Jungermannia," table 26; also in "English Botany," table 251, under the name of *Jungermannia obtusifolia*. Mr. M. B. Slater, an excellent authority on the subject, to whom I sent specimens, says the plant is rare in England.—David McArdle, Glasnevin.

ZOOLOGY.

MOLLUSCA.

MARINE SHELLS. In the *Zoologist* for May, Mr. H. C. Hart brings to a conclusion his "Notes on Marine Mollusca collected on the coasts of Donegal and Dublin," which have been running through several numbers. The title is a somewhat misleading one, "Donegal and Dublin" including the counties of Londonderry, Down, Louth, Wexford, Waterford, and Galway, and had the writer omitted ubiquitous species, and paid a little attention to the already published records of Thompson and

others as regards the rest, he might have saved the obliging editor a good deal of his valuable space. We extract the following species, as being among the rarer shells recorded:—*Donegal*, *Lima hians*, *Lucinopsis undata*, *Tellina squalida*, *Psammobia vespertina*, *Scrobicularia tenuis*, *Ceratisolen legumen*, *Solen vagina*, *Trochus granulatus*, *Adeorbis subcarinatus*, *Aplysia punctata*. Dublin, *Pecten tigrinus*, *Scrobicularia prismatica*, *Thracia papyracea*, *Pholas parva*, *Barlecia rubra*, *Homalogyra rota*, *Cæcum trachea*, *Pleurotoma costata*, *P. brachystoma*, *P. nebula*, *Cylichna acuminata*, *Aplysia punctata*. Elsewhere, *Pecten septemradiatus* (Derry); *Pinna rudis* (Wexford and Down); *Diplodonta rotundata* (Galway); *Isocardia cor* (Waterford and Louth).¹

Odostomia albella, Lovén, IN IRELAND. This little shell, which, so far as I am aware, has not been hitherto recorded in a recent state from Ireland, occurred to me in shell-sand lately gathered on the shore at Groomsport, Co. Down—a single example only was obtained. In a fossil state its only Irish record is in a paper which I recently laid before the Royal Irish Academy, in which it is noted as occurring in estuarine clay at West Bank, Belfast Lough. In both instances the species was kindly determined by Mr. J. T. Marshall of Torquay. The same shell-sand yielded—*Crenella decussata*, *Lima subauriculata*, *Modiolaria discors*, *Astarte triangularis*, the four British species of *Lacuna*, *Rissoa reticulata*, *R. cingillus*, *Odostomia lactea*, *O. interstincta*, *O. pallida*, and other commoner forms, all of them in a fresh state.—R. Lloyd Praeger.

BIRDS.

ARRIVAL OF SUMMER MIGRANTS.—Some readers of the *Irish Naturalist* may like to know the dates on which the summer migrants have arrived in this neighbourhood this year. The following are from personal observation:—Wheat-ear, March 22nd, between Kenmare and Killarney; Swallow, April 6th, Rossbeigh; Landrail, April 26th, Cahirciveen; Cuckoo, April 28th, Cahirciveen.—W. V. Delap, Cahirciveen, Co. Kerry.

Swallows were seen at Barne, and also near this town on April 16th for the first time this year.—Robert Hunter, Clonmel.

THE TREE-CREEPER (*Certhia familiaris*) AS A SONG-BIRD.—Is it a fact that “most of our writers on ornithology describe the Tree-creeper as a non-singing bird?” I am aware of one popular author (well-known in Ireland) who by implication does so; but as he pays the same indifferent compliment to both our common Wagtails, I can only assume that his definition of the word “song” is somewhat exacting. The Tree-creeper’s melody sounds to my ear like the syllables, “ticka-tee-tee-tee-tee-ticka-ticka,” and is usually uttered as the bird makes a pause in its progress up the tree-trunk, and holds its head sideways in a languishing attitude. I have the following noted as dates for first hearing the Tree-creeper’s song in different years:—1882, March 30th; 1885, March 20th; 1886, January 1st (but not heard again until March 13th); 1887, March 19th. Since the latter date, not having been out of Dublin in early spring, I have taken no notes on the subject.—C. B. Moffat, Dublin.

THE SPOTTED CRAKE (*Porzana maruetta*), ETC. IN CO. LOUTH.—The district lying inland from Dundalk, and extending on the one side to Crossmaglen, and on the other to Ardee, abounds in marshes, for the most part formed by bogs which have in days past been cut away, and which, owing to the want of fall for main drainage, remain unreclaimed. Many of these, even to the most experienced snipe-shot, are almost inaccessible, being composed of a floating sedge which a dog can hardly cross, and hence when, ten years since, I spent much time in pursuit of long-bills, it was sometimes my good fortune to come upon specimens of the rarer of the grallatores. The Water-rail (*Rallus aquaticus*) was to be met with everywhere, and I have frequently seen the young birds when duck-shooting in the month of August. In the same district I secured

¹ Carlingford is in Louth, not Down, as twice stated in the present paper.

specimens of the Common Bittern (*Botaurus stellaris*), Green Sandpiper (*Totanus ochropus*), Red Godwit (*Limosa algocephala*), and the Spotted Crake (*Porzana maruettii*). The latter was found frequently, but although I have no doubt they breed in the district, I was never successful in my search for their nests. Like the Water-rail, and, indeed, all gallinules, the Spotted Crake rarely resorts to flight unless it sees no other means of escape, preferring rather to take refuge in the nearest tuft of grass or sedge until found by the sportsman's dog. When it rises its flight is very rapid, not unlike that of the Quail, and being but a small mark it is not easily shot. One of the specimens secured by me is now in the Science and Art Museum, Dublin, and a second is to be seen at my house.—H. D. M. Barton, Antrim.

GEOLOGY.

PERFORATIONS IN CARBONIFEROUS LIMESTONE. In the demesne of Brittas, adjoining this village, there are some curious perforations in the limestone rock. The first of these perforations I observed are in a rock which crops out of a rather steep brae (now covered with a wood) for about four feet high. On the face of this rock I observed lately a number of round holes, as neatly formed as if bored into the stone by human hands. I was curious enough to examine the stone to see what caused these perforations, but found, to my surprise, that, in a part of the stone which beetled over, the holes were quite numerous, in fact the rock was quite honeycombed by them in places. I further observed that these holes all had an upward tendency, as I found by testing by the finger. These holes are all about an inch in diameter. In depth they extend for about three inches into the stone, their ends being blunt and rounded. The rock itself, from being exposed to the weathering influence of the atmosphere for untold ages, has in many places been wasted away, so that the sides of some of the holes have given way, and they now show merely a section of their former construction, or, according to their position, the blunted terminations of the little tunnels now seen as depressions on the face of the stone. Now what caused these perforations? Most certainly they were not caused by man. I have read that in the Mediterranean, and other warm seas, there is a perforating mussel which bores into submerged rocks. Could it be that when Ireland was covered by a warm sea, the water was inhabited by a similar boring mussel? If so, I would be glad to know if the remains of his work have been observed in other localities.—Owen Smith, Nobber, Co. Meath.

The phenomenon described by Mr. Owen Smith seems to be the same as what I have seen myself by the side of Lough Mask. The holes which I saw were just what he describes, many of them looking as if they had been bored artificially, they were so straight, and even, and circular. I did not see any on the rock *in situ*; I had not the opportunity of looking for them. What I saw were in stones forming the wall by the roadside. The slabs were portions of beds of the limestone, and the holes were at right-angles to the bedding surfaces. Some of the slabs were, as he says, quite honeycombed with them. Are there any lithodomous molluscs able to produce holes so large? I cannot think that they could make them so straight and even. The most probable explanation seems to be that they have been dissolved out by water; but why or how it should work in that way I cannot imagine. If Mr. Smith's are not at right angles to the bedding planes, it will be very interesting, and will help us to choose between the only two alternatives that I can think of, weathering, or the action of a boring mollusc.—Rev. M. H. Close, Dublin.

[Will Mr. Smith kindly forward us a specimen of the perforated rock.—Ed.]

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations to the Gardens are a pair of Harrier-Hawks, from F. A. Leigh, Esq.; an African monkey from H. M. Smith, Esq.; a Manx cat from Mrs. Moore; and a Horned Owl from W. W. Despard, Esq.

The following animals have been acquired by purchase:—a Camel, a male kangaroo, a pair of wallabys, a Serval, two opossums, and two Drills.

About 18,000 persons visited the Gardens in April.

DUBLIN MICROSCOPICAL CLUB.

APRIL, 21st.—The Club met at Mr. G. Y. Dixon's. Mr. W. Archer showed an alga sent to him by Mr. E. Parfitt, of Exeter, taken from a stream near that city. The plant consists of slender filaments of oscillataneous structure, and resembles *Leptothrix ochracea*, from which, however, it differs in its yellow colour in the mass. It may be *Oscillatoria leptothrix*.

Colonel O'Hara showed corpuscles of human blood after an attack of influenza.

Mr. G. H. Carpenter showed sections through the body of a larval *Halobates*.

Dr. McWeeney showed sections of miliary tuberculosis of the human oviduct. The giant-cells were numerous, and there was a great development of small-cell inflammatory tissue beneath the branched lumen of the tube. The bacilli, of which there were very few demonstrable, were, for the most part, contained in the giant-cells. There appeared to be a want of virulence in the organisms.

Professor Cole exhibited a section showing an inclusion of Ordovician rock in the granite of Killiney Park, Dublin. The included mass has been converted into a tourmaline-schist, boric acid having probably attacked it during the later stages of igneous activity.

BELFAST NATURALISTS' FIELD CLUB.

APRIL, 27th.—The President in the chair. This was the annual meeting. The senior Secretary (Mr. R. Lloyd Praeger, M.R.I.A.), read the annual Report, which showed that the membership was larger than ever previously in the history of the society, and that the Club was in a most flourishing condition. The Treasurer (Mr. W. H. Phillips, F.R.H.S.), submitted the Statement of Accounts, which, with the Report, was adopted. The office-bearers of the last year were re-elected, with some slight changes on the committee. Discussion ensued on a proposed change in the rules, and on the places to be visited during the summer session. The junior Secretary (Mr. F. J. Bigger), reported on some contemplated archæological restorations. Mr. Praeger exhibited a number of bones and fragments of antlers of the Irish Elk (*Cervus giganteus*) obtained at the base of the bed of peat underlying the docks at Belfast, which yielded the skull of the same species which he recently exhibited (*I. N.*, p. 22). An examination of the six collections to which prizes had been awarded concluded the business of the evening.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL, 30th.—The first excursion of the season was attended by forty-four members. The party walked from Carrickmines to the Dingle, and then on to the Scalp. Prof. Cole pointed out the chief physical features of these remarkable gorges, and explained their formation as at the last evening meeting of the Club (*I. N.*, p. 40). The party then proceeded over the hill into the Lower Glencullen Valley where the middle sands

and gravels of the Drift are exposed in a fine section. The points of interest were pointed out by Rev. M. H. Close. Some excellent photographs of geological features were obtained by Prof. Haddon and Mr. McNab. (The sketch of the weathering granite in the Dingle, p. 56, is from one of these). Though the interest of the excursion was mainly geological, some good botanical and entomological work was done. Dr. E. J. McWeeney collected *Puccinia umbilici*, æcidiospores of *Uromyces poæ* growing on *Ranunculus ficaria*, and other fungi, of which a detailed account will be given later. Of Coleoptera, Mr. J. M. Browne took *Helodes phellandrii*, a chrysomelid new to the Dublin list, *Badister bipustulatus*, and *Philhydrus melanocephalus*; while Mr. H. K. G. Cuthbert secured, among other commoner species, *Chlenius vestitus*, *Pterostichus versicolor*, *Bembidium doris*, *Phædon tumidulum*, *Hypera murina*, and *Sitones tibialis*.

CORK NATURALISTS' FIELD CLUB.

APRIL, 22nd.—Mr. T. Farrington, M.A., in the chair. Mr. W. J. Knight, LL.D., gave a lecture entitled "A Gossip on the Geology of Cork," illustrated by diagrams and specimens. The ice ages of the world, and the causes affecting them, were first dealt with, after which the lecturer pointed out the distinctive evidence in Ireland of the work of glaciers, especially in the neighbourhood of Cork. He maintained that the lie of mountains in England, Scotland, and Ireland, together with the fact of similar geological formations and minerals being found in each, proves the existence of original ranges now broken up. The old sea-bed of Blarney, and the quarries of Little Island, were described and explained. A discussion followed. The Secretary announced to the meeting Mr. J. O'Sullivan's munificent gift of his herbarium of the Co. Cork flora, containing 7,000 specimens of plants, to the museum of the society.

APRIL, 29th.—The President, Professor Hartog, D.Sc., F.L.S., in the chair. Mr. F. R. Rohu read a paper entitled "The Skelligs and their Feathered Inhabitants," illustrated by several stuffed specimens. Dealing with each species separately, Mr. Rohu gave a description of its plumage and habits. An account of the home-life of sea-birds from the first meeting of the mates to the maturity of their progeny was given with pleasing originality, as also some anecdotes showing the sympathetic qualities of the Guillemot. Mr. W. B. Barrington, Hon. Sec., following, gave a discourse on "Bird-life." After giving an outline of bird-classification, Mr. Barrington dwelt on the compensating qualities in the different zones. The power of flight and subsistence were explained and exemplified. The instinct in birds to migrate, and the ancient and modern theories were discussed, and the aerial routes, and the attractive power of light described. A sketch of local bird-life was then given.

MAY 6th.—Rev. J. O. Park in the chair. A discussion took place as to the best days for field-rambles, when it was decided to adopt alternate Wednesdays and Saturdays for the present. Mr. J. L. Copeman, Hon. Sec., gave a paper entitled, "A Gossip on Insect Life," illustrated by a large number of specimens and diagrams. Classification was first dealt with, after which Mr. Copeman explained the metamorphosis, more particularly of butterflies, flies, and beetles, showing the perfect and imperfect changes, and described the important function performed by insects in the fertilization of plants. A discussion followed. Intimation was given by the Secretary of Mr. Wolfe's offer to give duplicates of insects in his collection to the society's museum.

The following rambles have been taken by members of the Club:—
April 18th to Blarney, conducted by Mr. J. O'Sullivan.

April 23rd to Goulding's Glen, conducted by Mr. W. J. Knight, LL.D.

April 30th to Little Island, conducted by Mr. W. J. Knight, LL.D.

May 7th to Monkstown, conducted by Mr. J. H. Bennett and Mr. W. H. Shaw.

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No. 4.

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

(Continued from page 47.)

GASTROPODA.

PULMONATA.

GENUS—HYALINIA.

The species belonging to this genus are in most text-books united with those of the genus *Zonites*; but their claim to be placed under the genus *Hyalinia* has been fully recognised for some time past. This is a very ancient genus, and must have originated in the palaeozoic period, as it occurs fossil in Canadian Carboniferous strata.

Hyalinia cellaria, Müller.

I. II. — IV. V. — VII. VIII. — X. — XII.

This species is commonly distributed. The large specimens which, according to Thompson (15) have been taken in Dublin, are no doubt referable to the next species, which grows much larger. A single specimen which I took on Sherkin Island, Co. Cork, seems to me to agree with the description of *H. pictonica*, Bgt., but as was suggested to me by Mr. B. B. Woodward, it may only be an abnormal form of *H. cellaria*.

FOREIGN DISTRIBUTION.—It is common in Great Britain, and spread over the rest of Europe and Asia Minor, the Azores, Canaries, and Madeira. It is found also in Eastern North America, but is supposed to have been introduced.

Hyalinia Draparnaudi, Beck.

I. — — — V. — — VIII. — — —

There has been no previous record of this species from Ireland. It is the large shell which the late Mr. T. W. Warren found in Dublin, where it has also since been obtained by Prof. G. V. Hart. I myself have only found it on Valentia and the Aran Islands on the West Coast.

FOREIGN DISTRIBUTION.—In England it has only been found in the south-west, and it has a confined distribution in Western Europe ranging from Western Germany over France, Italy, and Corsica.

Hyalinia alliaria, Miller.

I. II. — IV. V. VI. VII. VIII. IX. X. XI. XII.

Considerable interest is attached to this species, as it has most probably originated somewhere in the British Islands, where it is one of the most common *Hyalinia*, while, except in a few isolated localities in Northern Germany, Denmark, and Southern Sweden, it is unknown in other portions of the globe.

(Hyalinia glabra, Studer.)

This species has been recently recorded from Co. Monaghan (10), but as no Irish collector has ever found a specimen, and some doubt seems still to prevail whether this species occurs in Great Britain, I venture to think that I may be justified in excluding it at present from the list of species inhabiting Ireland.

Hyalinia nitidula, Drap.

I. II. — IV. V. — VII. VIII. IX. X. — XII.

Many continental conchologists look upon *H. nitens*, Mich., as a distinct form, but it seems to me to be only a somewhat larger variety of the above. Both forms occur commonly in Ireland.

FOREIGN DISTRIBUTION.—Commonly distributed in Great Britain, Southern, Western, Central, and Northern Continental Europe, as far north as Southern Sweden.

Hyalinia pura, Alder.

— II. — IV. V. — VII. — — X. — XII.

This species is rather rare in Ireland. It is found in the Wicklow mountains and on Howth Hill, and I have also taken it at Renvyle in Connemara, and at Cultra in Co. Down. Mr. Waller (16) records it from Finnoe, Co. Tipperary.

FOREIGN DISTRIBUTION.—Great Britain and Continental Northern, Central, and Southern Europe. In the Alps up to 7,000 feet.

Hyalinia radiatula, Akler.

I. II. III. IV. V. — VII. VIII. — X. XI. XII.

Like the preceding, this is a rare species; but it has been taken in most parts of Ireland. Thompson (15) has met with it in several localities throughout Down and Antrim; Waller (16) reported it from Tipperary; and Milne (10) from Donegal and Fermanagh. I found it at Greystones (Co. Wicklow), Howth (Co. Dublin), Renvyle (Co. Galway), and Glengariff (Co. Cork).

FOREIGN DISTRIBUTION.—This is no doubt a very ancient species. It has been recorded from a number of places in Great Britain, and it ranges over nearly the whole of Europe and the Caucasus, also Siberia and North America, as far South as the Gulf of Mexico. (In America it is known as *Zonites viridulus*, Menke.)

Hyalinia crystallina, Müller.

I. II. — IV. V. — VII. VIII. — X. — XII.

This is equally common on the west and east coasts, as well as inland.

FOREIGN DISTRIBUTION.—Ranges over Great Britain and the rest of Europe, with the exception of the south-east, and is found on the Azores.

***Hyalinia contracta*, West.**

I. — — — — — — — — — —

This species is new to the British Fauna. The specimen which I obtained at Killarney is more like that described by Clessin as *H. dubreuilii*, but, as Mr. B. B. Woodward has pointed out to me, the latter is probably only a variety of *H. contracta*, and it is considered as such by Dr. Westerlund. It differs from *H. crystallina* in having one more whorl, and in the two last being equal in breadth, instead of the outer one being considerably broader.

FOREIGN DISTRIBUTION.—Sweden, Norway, Northern Germany, France, and Switzerland.

***Hyalinia fulva*, Müller.**

I. — — IV. V. — VII. VIII. IX. X. — XII.

By many authorities this species is placed in a separate genus *Conulus*, as its form differs so much from the general type of the *Hyalinia*. To judge from the large number of specimens obtained by Mr. Praeger in the Co. Down, it must be pretty common there, but about Dublin it is extremely rare.

FOREIGN DISTRIBUTION.—Like *H. radiatula*, this species has a very wide distribution, ranging over the whole of Europe, Northern Africa, the Azores, Siberia, and North America.

***Hyalinia excavata*, Bean.**

I. — — — V.? — — VIII. — — — —

On the south-west and west coast this species is fairly common, especially in Connemara, but it is evidently quite absent from the east coast, as neither my predecessors, Messrs. Warren and Thompson, nor myself, have ever found it, and the record from Dublin in Messrs. Taylor and Roebuck's list is, I venture to think, erroneous. By many Continental authorities this species, along with the next, is placed in a separate genus *Zonitoides*.

FOREIGN DISTRIBUTION.—Beyond Great Britain this species has only been found at a single locality—viz., Flensburg, in Northern Germany, and I think it is possible that, like *H. alliaria*, it may have originated in the British islands.

***Hyalinia nitida*, Müller.**

I. II. III. IV. V. — VII. VIII. IX. X. — XII.

This is *H. lucida*, Drap., and, as Thompson has already mentioned it is a very rare species in Ireland. He has recorded it from Kilmegan Bog (Down), Portarlinton (Queen's Co.), and Finnoe (Tipperary), while Miss Warren has kindly supplied me with specimens from Co. Sligo. It has also been found at Rathfarnham, and I myself, obtained a dead specimen at Stepaside (Dublin).

FOREIGN DISTRIBUTION.—This species has an enormous range, occurring over the whole of Europe, Algeria, Thibet, Turkestan, Siberia, Japan, and North America.

(TO BE CONTINUED.)

HEPATICÆ OF THE KING'S AND QUEEN'S COUNTIES.

BY DAVID M'ARDLE.

THE following list of Liverworts enumerates the joint collections made by myself and the Rev. Canon Russell of Geashill Rectory, at whose kind invitation I made two brief but very interesting excursions, one in the spring of 1890, and again, in August of last year, to the Bog of Allan, which occupies a considerable portion of the King's County eastward of the river Shannon. I also collected on a small portion of the Slieve Bloom Mountains, near Clonaslee, Queen's County. A visit to the mountain district earlier in the year, would have been more productive in the plants of which we were in search; still those gathered are highly interesting, and some of them are quite new to that part of the country. During the summer months want of water is often experienced, and a stillness prevails, and one misses the music of the cascades and tumbling streams of the counties of Kerry and Wicklow, whose moist warm glens are the home of more than half of all the Irish liverworts.

It will be obvious from this provisional list that these districts offer a fair field for further investigation and research, and they are part of a long tract of country from which the records of liverworts are very few.

* Placed before a species or variety denotes that it has not been reported from this locality, that I am aware of.

To Dr. Richard Spruce and M. B. Slater, Esq., F.L.S., of Yorkshire, I offer my best thanks for their kind replies when consulting them on matters of doubt.

Marchantia polymorpha, Linn.—Abundant on the bog near the Geashill railway station, King's Co.—D. McA., 1891.

Conocephalus conicus, Neck.—Margin of a stream, Welsh Island, King's County. Brosna river, stream on the Slieve Bloom mountains.—D. McA., 1891.

Lunularia cruciata, Linn.—Shady places, Geashill Rectory, King's Co.—C. D. R., 1890.

Frullania dilatata, Linn.—On the trunks of trees, Geashill, King's Co., Brittas Demesne, Queen's Co., plentiful.

***Drepano-Lejeunea hamatifolia**, Hook.—On the trunks of trees and on decayed wood, in Brittas Demesne, near the Lake, Queen's Co., C. D. R. and D. McA., 1891.

***Colo-Lejeunea minutissima**, Smith.—On moss covered trunks of trees and on decayed wood, Brittas Demesne, abundant near the lake.—D. McA. and C. D. R., 1891.

Eu-Lejeunea serpyllifolia, Dicks.—Cappard, Queen's Co. C. D. R., 1891.
var ***patens**, Spruce MSS., *L. patens*, Lindberg.—Dr. Moore on Irish Hepaticæ, excellent fig., plate 43.—*R. I. A. Proc.*, ser. 2, vol. ii.

Radula complanata, Linn.—On the trunks of trees, Brittas Demesne, and Geashill Rectory—plentiful.

Lepidozia reptans, Linn.—Damp bank, Geashill Rectory, C. D. R., 1890.

Cephalozia sphagni (Spruce on *Cephalozia*), *Jungfermania Sphagni*, Dicks., Crypt. Brit. (1785). Bogs amongst *Sphagnum* in both counties—plentiful.

- ***C. lammersiana**, Huben.—*Jung. bicuspidata* γ *uliginosa* Nees, Eur. Læberm II. 253, et (exparte) γ γ *obliquata* Nees I. C. 254, *J. bicuspidata* E. Bot. t. 2, 239—Wet places, Ard bog, King's Co.—C. D. R., 1890-91. Marshy place, side of a stream, Slieve Bloom mountains, Queen's Co.—D. McA., 1891.

Good authorities consider this to be the dioecious and perfect form of the following:—

C. bicuspidata, L. Hook, Brit. Jung. t. II.—Damp banks, plentiful in both counties.

var ***setulosa**, Spruce.—Pusilla, foliis parvis, lobis subapiculatis, perianthiis ore truncato setulosis (setis 2-3 cellulas longis) bracteatum laciniis lato-subulatis acuminatis utrinque 1-2 spinis. Ard bog, King's Co.—C. D. R., 1891. This form is new to the Irish Flora.

- ***C. connivens**, Dicks.—Damp bank, Ard bog, C. D. R., 1890-91. Bog on Welsh Island, King's Co.—D. McA., 1891.

var.—Larger and with longer hair, points to the leaves, than in the normal state.—C. D. R., 1891. Rare or overlooked in Ireland.

- ***C. catenulata**, Hubener.—Damp bank, Ard bog, amongst the larger Hepaticæ.—C. D. R.—1891. [1891.]

- ***C. divaricata**, Smith.—Ard bog, amongst the larger Hepaticæ.—C. D. R., **Lophocolea bidentata**, Lim.—on decayed wood and on damp banks, plentiful in both counties.

Chiloscyphus polyanthos, Corda.—Side of a stream on the Slieve Bloom mountains.—D. McA.—1891.

Kantia trichomanes, Dicks.—Plentiful on damp banks, very fine on Ard bog.—C. D. R., 1891.

- ***K. arguta** Mont. (Lind.)—E. Bot. tab., 1875. Dioecious.—Stems elongated near the apex, with smaller and more remotely placed leaves, often tipped with gonidiferous gemmæ. Leaves roundish, oblique, apex bidentate, fragile, divergent, under leaves (stipules), deeply bifid segments subulate.

Amongst *Sphagnum*, Ard bog, King's Co., C. D. R., 1891. Side of a stream on the Slieve Bloom Mountains, on moist clay, D. McA. 1891.

Dr. Moore in his work on "Irish Hepaticæ," p. 632, writes:—"Hab. on wet banks *very rare in Ireland*. The few Irish specimens known were collected at Luggielaw, Wicklow, creeping over the stems of *Nardia compressa*, Dr. Lindberg detected them among my specimens when examining them."

Since the publication of this valuable work in 1876, I know that the plant has also been gathered in Killarney by R. W. Scully, Esq.; Loughbray, Co. Wicklow, amongst *Sphagnum* D. McA., 1878; and at Killakee Glen, Co. Dublin, growing amongst *Rhynchoslegium swartzii* D. McA., September, 1890.

Saccogyna viticulosa, Mich.—Ard bog, King's Co., C. D. R. 1890.—Slieve Bloom Mountains, Queen's Co., D. McA., 1891.

Trichocolea tomentella, Ehrhart.—Bog near Geashill, King's Co., D. McA., 1891.

Blepharostoma setacea, Web.—Ard bog, King's Co., C. D. R., 1890, near Cappard, Queen's Co., 1891.

Scapania undulata, Dumort.—Wet rocks bed of a stream, Slieve Bloom Mountains, D. McA., 1891.

Diplophyllum albicans, Linn.—Common in both counties.

Plagiochila asplenoides, Linn.—Damp bank Slieve Bloom Mountains, D. McA.; 1891.

P. spinulosa, Dicks.—Slieve Bloom Mountains, near Clonaslee. C. D. R., 1891.

Jungermania (Aplozia) crenulata, Smith.—Roadside, Slieve Bloom Mountains, Queen's Co., D. McA., 1891.

- ***J. (Lophozia) bantriensis**, Hook.—MSS. *J. stipulaceum* Brit. Jung. t. 41. —Amongst *Campylopus*, in a damp shady place, on a sandy deposit, side of a stream, at the foot of the Slieve Bloom Mountains, near Clonaslee, D. McA., 1891. The following were the only localities previously known for this rare plant in Ireland:—Bantry, Miss Hutchins; Glengariff, Dr. Carrington; Brandon Mountains, Co. Kerry; Benbulbin, Co. Sligo; and Gleniff, Co. Leitrim, Dr. D. Moore. Later investigation, by Mr. Pearson, of a portion of the Leitrim plant, proves it to be the var *Mullerii*. I am not aware that this form had ever been previously found in Ireland.

The plant gathered on the Slieve Bloom Mountains agrees well with the var *musicola* mentioned by Dr. Spruce in an exhaustive description of *J. bantriensis* in his paper on the "Musci and Hepaticæ of Teesdale," published in the *Transactions of the Bot. Soc. Edin.*, vol. ii.

J. (L.) incisa, Schrad.—Bog near Geashill, C. D. R., 1890, Slieve Bloom Mountains, plentiful, D. McA., 1891.

- ***J. (Gymnocolea) turbinata**, Wils. in Eng. Bot. Suppt. t. 2,744.—Damp bank near Geashill, King's Co., C. D. R., 1890-91. Bank by the roadside, Slieve Bloom Mountains, D. McA., 1891.

Nardia emarginata, Ehrhart.—On stones, side of a stream, Slieve Bloom Mountains, D. McA., 1891.

N. scalaris, Schrader.—Side of a stream, Slieve Bloom Mountains, D. McA., 1891.

Pellata epiphylla, Dill.—Plentiful in moist places in both counties.

- ***P. calycina**, Nees.—Bog near Geashill, King's Co., C. D. R., 1890. Side of a stream, Slieve Bloom Mountains, D. McA., 1891.

Metzgeria furcata, Linn.—Plentiful on the trunks of trees in both counties.

var *æuginosa*.—On the trunks of trees Cappard, and Killeigh Abbey, Queen's Co., C. D. R., 1891.

- ***M. conjugata**, Dill.—Hist. Musc. t. 74, fig. 45. On the trunks of trees, Geashill Rectory, C. D. R., 1891.

Riccardia multifida, Dill.—Plentiful in boggy places in both counties.

- ***R. latifrons**, Lindberg.—*J. multifida* Hook. Brit. Jung. tab. 45, figs. 4, 7, 12. Bog near Geashill, C. D. R., 1890. Slieve Bloom Mountains, D. McA., 1891.

- ***R. pinguis**, Linn.—On a decayed trunk of a tree in the bog Welsh Island, D. McA., 1891, ♂. Bog near the railway station Geashill, Co., C. D. R., 1890. Side of a stream, Slieve Bloom Mountains, D. McA., 1891.

THE BIRDS OF RATHLIN ISLAND, CO. ANTRIM.

BY ROBERT PATTERSON, M.B.O.U.

(Continued from page 53.)

***Alauda arvensis**, L.—SKYLARK. Common on the higher grounds, where it breeds; frequently killed at the lighthouse in autumn.

***Cypselus apus**, L.—SWIFT. Common in summer. They breed in the church tower, and also on the White Rocks at the N. side of Church Bay, in company with the House-Martins.

Caprimulgus europæus, L.—NIGHTJAR. The only known occurrence was in June, 1850, when a specimen was shot.

- ***Cuculus canorus**, L.—CUCKOO. A constant summer visitor. A young bird, recently fledged, was found in a deserted nest in August, 1883. Frequently observed by light-keepers; earliest date noted, April 20th.
- Strix flammea**, L.—BARN-OWL. Formerly known as resident and breeding in holes in the rocks; now very rarely seen.
- Asio otus**, L.—LONG-EARED OWL. Very rare; one was shot 14th June, 1853, and another was caught alive in April, 1863.
- A. accipitrinus**, Pallas.—SHORT-EARED OWL. Has once occurred, in November, 1879, when a fine specimen was shot.
- Circus æruginosus**, L.—MARSH-HARRIER. Seen by the late R. Gage, 12th June, 1867, searching for prey in one of the marshes at the west end of the island. A bird supposed to be of this species was seen by several people in the autumn of 1891.
- Buteo vulgaris**, Leach.—COMMON BUZZARD. One was caught alive with a broken wing below the cliffs on the north side, 28th February, 1845. Another was found dead in March, 1879. These are the only known occurrences.
- Haliaetus albicilla**, L.—SEA-EAGLE. This bird was formerly a constant resident, and bred in the rocks on the north side of the island, but owing to the havoc it committed on young lambs it was shot down and the nests robbed. It has not been seen for some years. Thompson, writing in 1849, says "In the island of Rathlin the Sea-Eagle is said to have an eyrie." I have not been able to find the date of the last attempt to breed.
- Accipiter nisus**, L.—SPARROW-HAWK. Occasionally seen following small birds. In October, 1867, one was seen by the land-steward pursuing a thrush, which it followed into his kitchen, breaking a pane of glass in the window.
- Falco islandus**, Gmelin.—ICELAND FALCON. A fine specimen was seen hovering over a sheep-farm, and was shot by the shepherd, on March 9th, 1865. Its extreme length was 20 inches.
- ***F. peregrinus**, Tunstall.—PEREGRINE FALCON. A constant resident, breeding in the cliffs at the north side of the island. Two pairs are known to breed regularly there.
- F. æsalon**, Tunstall.—MERLIN. The only occurrence of this little falcon was on the 10th December, 1888, when one was caught alive in a house into which it had pursued a bird.
- ***F. tinnunculus**, L.—KESTREL. Very common; breeds on cliffs all round the island. On the 2nd June, 1889, my cousin, Mr. Praeger, took a curious clutch of four eggs. They were white, mottled very slightly with reddish-brown, and the texture was exceedingly rough.
- Phalacrocorax carbo**, L.—CORMORANT. Once very common at the Bull Rock, where they bred in the caves. They are only occasionally seen now, and have ceased to breed. An unusually large one taken alive in 1867, disgorged a Wrasse 14 inches long, 10 inches in girth, and 2 lbs. weight.
- ***Phalacrocorax graculus**, L.—SHAG. Very common, and breeds regularly in the caves near the Bull Rock; also at the north side of the island.
- Sula bassana**, L.—GANNET. Often seen fishing about the island during the autumn, and frequently reported by the light-keepers. Young birds have been picked up on the beach after storms, and I observed adults flying over the island in June.
- Ardea cinerea**, L.—COMMON HERON. Many frequent the shores and reedy marshes, where small eels abound. Some of the inhabitants say they breed on the island, but Mr. Gage never saw a nest.
- Anser cinereus**, Meyer.—GREY LAG-GOOSE. Only seen in hard winters. One was shot in a field in October, 1867, and an adult female, weighing 8 lbs., was shot in January, 1867, on one of the loughs.
- A. albifrons**, Scopoli.—WHITE-FRONTED GOOSE. Has been seen in the bay, near the shore, although a specimen has not yet been obtained. A single bird was observed in November, 1891.

- A. segetum**, Gmelin.—BEAN GOOSE. Frequently seen in winter, and specimens have been procured at different times.
- Bernicla leucopsis**, Bechst.—BERNACLE GOOSE. Has once occurred, one being shot on Ushet lough, 30th January, 1868.
- B. brenta**, Pallas.—BRENT GOOSE. Often seen in winter, sometimes in large flocks, and specimens have been secured.
- Cygnus musicus**, Bechst.—WHOOPEE SWAN. Rare; one was shot on Ushet lough in February, 1848, and two others seen. A flock of 25 were seen in Church Bay in December, 1875. They were very wild, and being followed by Mr. Gage in a boat, they all went away in a westward direction.
- C. bewicki**, Tar.—BEWICK'S SWAN. Not uncommon in winter on the rocks, north and south. Two were shot on Claggan lough, 22nd November, 1882, and another on Ushet at the same time, out of a flock of seven.
[A Black Swan, **C. atratus**, was shot by the Rev. G. McLean, on one of the loughs about the centre of the island, on the 23rd November, 1883.]
- Tadorna cornuta**, Gmelin.—COMMON SHELDRAKE. Often seen in winter, and specimens have been frequently shot in the autumn. In the *Migration Report* for 1882, the light-keeper reports that the Sheldrake breeds on the island, but Mr. Gage does not mention the fact, and my enquiries tend to prove that it does not breed.
- ***Anas boscas**, L.—WILD DUCK. Very common, and breeds in every suitable place. I obtained a clutch of seven very pale buff eggs on the island.
- ***Querquedula crecca**, L.—TEAL. Common, and breeds in moderate numbers.
- Mareca penelope**, L.—WIGEON. Common on the large loughs in winter, and in Church Bay.
- Fuligula ferina**, L.—POCHARD. Common winter visitor to the loughs, and frequently shot.
- F. cristata**, Leach.—TUFTED DUCK. Fairly common among the other ducks in winter.
- F. marila**, L.—SCAUP. Very common in winter in Church Bay, and not often seen in the loughs; but in May, 1865, a mature male in breeding plumage was shot on Ushet lough.
- Clangula glacien**, L.—GOLDEN-EYE. Common in Church Bay in the winter months, but never seen on the island.
- Harelda glacialis**, L.—LONG-TAILED DUCK. Immature birds are not uncommon in Church Bay in the autumn and winter months. A fine male in full plumage was shot in November, 1863.
- Somateria mollissima**, L.—EIDER DUCK.—Not unfrequently seen in winter. Four came into Ushet port, 13th September, 1870, and one—a young male—was secured. A male in fine mature plumage was shot at the east side, 17th May, 1872, and on the 10th November, 1877, a female was shot on the strand. An adult male was seen in Church Bay, 16th November, 1882, and was followed without success. They are more often seen at the east and south sides of the island, and when they depart it is always in an eastward direction. Females are more commonly seen than males. "April 3rd, three Eider Duck drifting W. 16th, seventeen Eider Duck on the water." (*Migration Report*, 1886, page 173.)
- S. spectabilis**, L.—KING-EIDER. Has once occurred. A female was shot in a bay, west of Church point, in November, 1861, and was sent to Mr. Howard Saunders for identification.
- Edemia nigra**, L.—COMMON SCOTER. Not at all common. A female was shot near the lighthouse, in November, 1869, and a mature male was shot in Ushet port, in March, 1873.
- Mergus merganser**, L.—GOOSANDER. Very rare; two females were shot near the west end of the island, in January, 1877, and another female at Ushet port in January, 1878.

- M. serrator**, L.—RED-BREASTED MERGANSER. Often seen fishing in Church Bay, and specimens have been shot.
- ***Columba livia**, Gmelin.—ROCK-DOVE. Very common, and breeds in considerable numbers at the White Rocks.
- Phasianus colchicus**, L.—PHEASANT. Has several times been observed on the island at long intervals, but no specimen has yet been secured.
- Perdix cinerea**, Latham.—PARTRIDGE. Is never seen except in very hard weather; last occurrence, December, 1878.
- Coturnix communis**, Bonn.—QUAIL. Has occasionally been met with. One was shot in December, 1846, and another in January, 1867.
- ***Crex pratensis**, Bechst.—CORN CRAKE. Common in the meadows and cornfields, where it breeds. Earliest date heard, April 27th.
- ***Rallus aquaticus**, L.—WATER-RAIL. Frequent in the marshes, where it breeds.
- ***Gallinula chloropus**, L.—WATER-HEN. Very common in all the loughs, where it breeds.
- ***Fulica atra**, L.—COOT. Very common, and breeds in large numbers.
- (TO BE CONTINUED.)

COUNTY DUBLIN, PAST AND PRESENT.

BY PROF. GRENVILLE A. J. COLE, F.G.S.

(Continued from page 57.)

IV.—THE CARBONIFEROUS PERIOD.

DURING the Silurian period, as we have seen, the east of Ireland was being converted into dry land; and at its close great lakes, even in the south and west, had taken the place of the sea, and continued to prevail during the succeeding Devonian period. The great accumulations of sand and conglomerate in these lake-basins, giving us now such mountain-masses as the Reeks of Kerry, must have been derived from the land-surfaces in their immediate neighbourhood; and thus the sand worn from the schists and granite of the Leinster chain no doubt contributed largely to the "Old Red Sandstone" of the east.

But then the sea, temporarily excluded from the Irish area, returned as the Devonian land again subsided. Marine animals, resembling in general characters those already living in the Devonian sea of Belgium and S.W. England, crept in over Co. Dublin, marking the opening of the great Carboniferous period. The first deposits in this county, forming along the shore-line, were coarsely conglomeratic, and are often termed "Upper Old Red Sandstone." This old iron-stained beach, formed of pebbles of Cambrian quartz and various mingled rocks, has been exposed by denudation on the north side of the promontory of Portrane. There it overlies the far older Ordovician, and is succeeded regularly by the Carboniferous shales and limestones. This same handsome conglomerate can be seen in little rocky bosses in the field immediately east of Donabate railway-station.

But, as Mr. G. H. Kinahan¹ strongly urges, such conglomerates recur at various levels in the Carboniferous. No large mass of land can be uniformly and suddenly submerged. The shore-line, during subsidence, gradually recedes; islands are left for a time, finally to be buried in the sediments; and from their flanks torrents occasionally roll down coarse material, forming irregular bands of conglomerate among the more normal deposits. Thus on the projecting rocks about one and a half miles south of Skerries, a bed occurs in the Carboniferous full of partly rounded flakes of Ordovician shale and pebbles of yet older quartz. The Ordovician is exposed at Skerries itself, and at Shenick's Island immediately opposite; and thus at the present day marine beaches are forming in this area in precise repetition of those of Carboniferous times. More striking conglomerates can be seen at the southern side of the entry to Rush harbour, forming considerable beds in the steeply dipping Carboniferous series. The coarseness of the materials shows that land was not far off at the time of their deposition.

In its more finely grained deposits the Carboniferous system of Co. Dublin also bears evidence of abundant foreign material. Much of the limestone, formed in the deepening sea by the accumulation of shells, crinoid-stems, etc., assumes a black argillaceous character; such beds have been styled the "Calp." If the rock is dissolved in acid, the black clay is separated, and forms a fine mud in the bottom of the vessel. As has often been pointed out,² this mud was derived from the neighbouring spurs and islands formed of Ordovician or older rocks.

In the south of the county, the foreign bodies in the "calpy" limestone give us conclusive proof as to the antiquity of the granite chain. Both schistose fragments from the altered Ordovicians, as may be seen in the stones used for the Booterstown sea-wall, and granite fragments, as in the quarries of Milltown and Crumlin,³ are embedded in the limestone, and prove that the igneous mass had consolidated before the Carboniferous sea invaded the country. Dr. Haughton has observed pieces of granite in the limestone as much as eight inches in diameter. The sea clearly wrapped round the flanks of the Leinster chain, and continued subsidence finally allowed of the deposition of Carboniferous strata sufficient to bury even the highest summits.

The great mass of the Lower Carboniferous strata of County Dublin may be classed as compact grey or darker limestone, well bedded, and abounding in marine fossils. A good list of these and of their localities has been published by Mr. W. H.

¹ "Geology of Ireland," p. 64.

² Memoir to sheets 102 and 112, Geol. Survey of Ireland, 2nd ed., p. 7.

³ Haughton, "Notice of the occurrence of fragments of Granite in Limestone," *G. S. D.*, v., 113; Montgomery, "Granite in Limestone near Rathfarnham," *G. S. I.*, i., 15.

Baily.¹ The quarry west of St. Doolagh's, a hamlet $2\frac{1}{2}$ miles south of Malahide, where half of an ovoid hill has been already cut away, offers perhaps the most fascinating field. As in all compact limestones, the fossils stand out on weathered surfaces, but are difficult to extricate entire.

The Carboniferous sea was rich in corals of the old tetracorallan type; in brachiopods, particularly *Spirifer* and *Productus*; in gastropods, as *Euomphalus*, which is coiled almost in one plane; and in cephalopods, as *Nautilus* and its extinct straight ally, *Orthoceras*. But the lower types still largely predominated; taking as an example 345 species of shell-bearing animals from the Lower Carboniferous Limestone or Ireland, as cited by Sir Richard Griffith in one of his famous lists,² we find the following percentages:—Brachiopods 37.5, Lamellibranchs 21.9, Gastropods 18.1. Utilising 527 species living in modern British seas,³ the percentages are:—Brachiopods 1.3, Lamellibranchs 32.6, and shell-bearing Gastropods no less than 48. Perhaps the life of the Carboniferous sea seems still more remote from that of our times when we examine the larger forms. The fishes are all elasmobranchs (sharks and rays); or ganoids, like the now restricted *Lepidosteus* of America and *Polypterus* of the Nile; or dipnoi, like *Ceratodus* of Queensland, a fish linked very closely to the amphibians. Of the teleosteans, the familiar modern bony fishes, there is not a trace in any country. In Co. Dublin only a few teeth and scales of fishes have been found.

We know that amphibians walked upon the adjoining land—in Upper Carboniferous times at any rate;⁴ but no true reptile had arisen to assert itself among them. Plants have become washed in here and there from the land,⁵ as, for instance, near Loughshinny; but the great development of low types of vegetation in the Carboniferous period must be studied in beds which denudation has removed from Co. Dublin.

The Carboniferous Limestone has undergone two marked types of alteration. Firstly, chert has frequently developed, silica replacing the carbonate of lime, and flinty nodules and bands resulting. These can be beautifully seen, running parallel to the bedding, in the low promontory north of the sands at Rush. The chemical aspects of Irish cherts has been discussed by Mr. Hardman,⁶ and sections have been described by

¹ "Palæontology of County Dublin," *G. S. I.*, v., pp. 85-95.

² "Localities of the Irish Carboniferous Fossils," *G. S. D.*, ix. (1860),

p. 37.

³ "Report of the British Association for 1860," p. 218.

⁴ "Huxley and Wright, "On Fossil Vertebrata from the Jarrow Colliery, *Trans. Roy. Irish Acad.*, xxiv. (1867), p. 351; Baily, *Rep. Brit. Assoc.* for 1878, p. 530, and for 1883, p. 496.

⁵ Griffith, *G. S. D.*, viii., 78.

⁶ *Sci. Trans. Roy. Dublin Soc.*, i. (new series), p. 85.

Prof. Hull,¹ Prof. Sollas² and Dr. Hinde³ showed that sponge-spicules were abundant in such specimens, as in the Vectian cherts of England. The cherts must, indeed, be attributed to the solution of the siliceous skeletons of organisms, such as sponges, radiolarians, and diatoms, and the aggregation and redeposition of the silica around their remains, and often as a replacement of the limestone. While the fine limestone-mud may be thus replaced by chert, the larger calcareous fossils often escape; and finally these become dissolved away, leaving only hollow moulds in the hard chert. A pleasing instance of this, with casts of stems of crinoids, occurs in a nearly vertical bed in the shales north of Brook's End on the Loughshinny coast. Of the pseudomorphic replacement of chalk by flint there can be no manner of doubt; and the same process, acting long subsequently to the consolidation of the rock, has given us the frequently irregular chert nodules of the Irish Carboniferous Limestone.⁴

The second type of alteration of the limestone is its conversion into a dolomite by substitution of magnesia for lime. The abrupt change of colour, from the blue-grey limestone to the brown dolomite, is often startling; probably the chemical substitution includes the introduction of iron also, the carbonate of iron then readily oxidising and colouring the altered patches. This irregular chemical change can be seen at St. Doolagh's; in a coarse degree on the shore south-east of Rush; and, nearer Dublin, in the low exposure under the drift at the south-east end of Sutton strand.⁵

The highest Carboniferous beds in Co. Dublin are certain shales in the north, which have been rather variously located in the system. Mr. Baily⁶ preferred to retain them as Lower Coal Measure Shales, to which they had been referred by Jukes.⁷ They are seen, in striking contrast to the more resisting limestones, caught in the synclinals of the latter south of the hamlet of Loughshinny. The earth-movements which have so beautifully folded the Carboniferous Limestones along that coast, making it one of the finest studies that the physical geologist can desire, have contorted and compressed the black and orange shales until they imitate the reversed folds and thrusts of a mountain-chain. During these post-Carboniferous movements, denudation was actively at work, and some 2,000 feet of Coal Measures and other Upper Carboniferous strata, formerly present, have been entirely removed from Co. Dublin.

(TO BE CONTINUED.)

¹ *Sci. Trans. Roy. Dublin Soc.*, i. (new series), p. 80.

² "On Sponge-spicules in Chert from Ireland," *Ann. and Mag. Nat. Hist.*, 5th ser., vol. vii., p. 141.

³ "On the Organic Origin of Chert in the Carboniferous Limestone of Ireland," *Geol. Mag.*, 1887, p. 435.

⁴ See, however, Hinde, *Geol. Mag.*, 1887, p. 445; G. H. Kinahan, *ibid.*, p. 521; and Hull, *ibid.*, p. 525.

⁵ See Apjohn, *G. S. D.*, i., 371; and Scouler, *ibid.*, 382.

⁶ "Palæontology of Co. Dublin," *G. S. J.*, v., 94.

⁷ *G. S. D.*, viii. (1859), 162.

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A., F.E.S.

(Continued from page 59.)

STAPHYLINIDÆ.

- Actobius cinerascens**, Grav.—Loughnashade, Mullinure, Lowry's Lough in moss and flood-rubbish.
- Xantholinus punctulatus**, Payk.—Common throughout district.
- X. ochraceus**, Gyll.—Dean's Hill, in moss.
- X. atratus**, Heer.—Drummanbeg Lake, in moss.
- X. linearis**, Ol.—Common throughout district.
- X. longiventris**, Heer.—Near the Cathedral.
- Baptolinus alternans**, Grav.—Palace Demesne, in rotten wood, not common.
- Othius fulvipennis**, F. Grav.—Common throughout district.
- O. melanocephalus**, F. Grav.—Common throughout district.
- O. myrmecophilus**, Kies.—Common throughout district.
- Lathrobium elongatum**, L. } Common throughout district.
- L. boreale**, Hoch. }
- L. fulvipenne**, Grav.—Lowry's Lough, banks of Butterwater, Palace Demesne.
- L. brunnipes**, F.—Common throughout district.
- L. longulum**, Grav. } Lowry's Lough, etc., in moss, pretty common.
- L. quadratum**, Payk. }
- L. terminatum**, Grav.—Loughnashade, in moss, not common.
- var. **immaculatum**, Fowler.—Drummanbeg Lake, Drummanmore Lake, in moss, not common.
- Cryptobium globerrimum**, Herbst.—Common throughout district.
- Stilicus rufipes**, Germ. } Common throughout district.
- S. orbiculatus**, Er. }
- S. affinis**, Er. }
- Lithocharis ochracea**, Grav.—Dean's Hill—rare.
- Sunius diversus**, Aube.—Common throughout district.
- S. angustatus**, Payk.—Mullinure, in moss, not common.
- Evaesthetus ruficapillus**, Lac.—Very common in moss from marshy ground.
- E. læviusculus**, Mannh.—Not quite so common as preceding, found under the same conditions.
- Dianous cœrulescens**, Gyll.—Folly, in moss from bed of stream—rare.
- Stenus guttula**, Müll., Mullinure—sweeping—not common.
- S. bimaculatus**, Gyll.—Mullinure—Common.
- S. juno**, F.—Common throughout district.
- S. speculator**, E.—do. do.
- S. providus**, v. **rogeri**, Kr.—do.
- S. canaliculatus**, Gyll.—Loughgall, Dean's Hill—not common.
- S. fuscipes**, Grav.—Mullinure, in moss—not common.
- S. declaratus**, Er.—Mullinure, Tyross, in moss—fairly common.
- S. brunnipes**, Steph.—Mullinure—rare.
- S. impressus**, Germ.—Mullinure, Edenmore—in moss.
- S. flavipes**, Steph.—Common throughout district. [etc.]
- S. pubescens**, Steph.—Lowry's Lough, Loughnashade—sweeping reeds.
- S. binotatus**, Ljungh.—Lowry's Lough—not common.
- S. canescens**, Rosh.—Loughnashade, on reeds—rare.
- S. pallitarsis**, Steph.—Loughnashade, Lowry's Lough, etc.—common.
- S. bifoveolatus**, Gyll.—Mullinure—not common.
- S. nitidiusculus**, Steph.—Mullinure, Lowry's Lough—in moss.
- S. cicindeloides**, Grav.—Mullinure—not common.

- Stenus similis**, Herbst.—Mullinure—fairly common.
S. latifrons, Er.—Common throughout district.
Platystethus arenarius, Fourc.—Common throughout district.
Oxytelus rugosus, Grav. } Common throughout district.
O. laqueatus, Marsh. }
O. sculpturatus, Grav.—Mullinure, Palace Demesne—pretty common.
O. nitidulus, Grav.—Mullinure—not common.
O. complanatus, Er.—Palace Demesne, Drummanmore Lake, Cathedral Grammar School Playground—pretty common.
O. tetracarínatus, Block—Palace Demesne, Drummanmore Lake—not common.
O. fairmairei, Pand.—Mullinure—rare.
Haploderus colatus, Grav.—Little Castledillon, Mullinure, Lowry's Lough—not common.
Trogophlæus bilineatus, Steph.—Lowry's Lough, in moss—not common.
T. rivularis, Mots.—Lowry's Lough—in moss—rare.
T. elongatulus, Er.—Mullinure—in moss—pretty common.
T. corticinus, Grav. Loughnashade, Mullinure—in moss—not common.
T. tenellus, Er.—Loughnashade—not common.
Syntomium aeneum, Palace Demesne, in moss—rare.
Lesteva longelytrata, Goeze.—common throughout district.
L. sharpi, Rye.—Mullinure—not common.
L. sícula, Er.—Mullinure, in flood rubbish and moss—common.
Acidota crenata, F.—Lowry's Lough, in moss—not common.
Lathrinæum atrocephalum, Gyll.—Little Castledillon, Loughgall, in moss—not common.
L. unicolor, Palace Demesne, in moss—rare.
Homalium rivulare, Payk.—Cathedral Grammar School Playground, Mullinure.
H. allardi, Fairm.—Cathedral Grammar School Playground, crawling about in the sunshine, Mullinure—sweeping.
H. rufipes, Fourc. } Common throughout district.
H. concinnum, Marsh. }
Anthobium minutum, F. Mullinure, sweeping—fairly common.
Proteinus ovalis, Steph.—Palace Demesne, etc., in moss—fairly common.
Megarthus denticollis, Beck. } Common throughout district.
M. depressus, Payk. }
M. affinis, Mill. Palace Demesne, in moss—not common.
Phlæobium clypeatum, Müll.—Little Castledillon, in moss—not common.
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PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

Recent gifts to the gardens comprise two Japanese mice from J. B. O'Callaghan, Esq.; two alligators from Dr. Finegan; an armadillo from the Very Rev. M. A. Moore; and a marten from A. Rutledge, Esq.

About 8,300 persons visited the gardens in May.

DUBLIN MICROSCOPICAL CLUB.

MAY 19th.—The Club met at Mr. Greenwood Pim's, who showed a specimen of *Gymnosporangium juniperi*.

Mr. F. W. Moore showed *Uredo lynchii*.

Mr. W. F. de V. Kane exhibited *Pondermium pini*.

BELFAST NATURALISTS' FIELD CLUB.

MAY 21ST.—The first excursion of the season was held on this date. The party, thirty-six in number, took the 8.15 train to Ballycastle, and proceeded on cars westward along the north Antrim coast to White Park Bay. There the secretaries announced that two prizes would be offered for the best collections of shells and antiquarian objects respectively, made during the day. The members then scattered over the shore and sand-dunes, and worked back eastward along the shore. The great profusion of the Meadow Cranesbill (*Geranium pratense*) was specially noted, and though it evidently preferred the banks and roadsides of the high ground overlooking the bay, plants were found growing among the loose sands of the shore. To archaeologists White Park Bay is a well-known and fertile hunting-ground. Every gale which disturbs the shifting sands above tide-mark reveals a fresh portion of the old surface, littered with rude flint implements, bones, fragments of pottery, and cinders. On the present occasion the greater part of a cinerary urn was obtained, and a large number of other relics. The district proved poor in shells, though large numbers of a limited number of land shells were scattered over the strand. The machines were again mounted at Ballintoy, and the party drove back to Ballycastle, where tea was in waiting, after which the judging of collections, and awarding of prizes took place, and the party returned by the 5.55 train, reaching Belfast at nine o'clock.

MAY 28th.—The first excursion of the Microscopical Section of the club took place, the Bog Meadows being the locality selected. The weather was extremely unfavourable, and there was consequently a small turn out of members, but the programme was carried out in all particulars, and a good collection of fresh-water material obtained for subsequent examination.

DUBLIN NATURALISTS' FIELD CLUB.

The second excursion of the season to Brittas and the Coronation Plantation was fixed for 28th May, but, on account of violent rain, was postponed until 4th June. Unfortunately the weather was again unpropitious; only a few members ventured to start, and these were forced to return before the appointed time without having done much collecting.

ROYAL DUBLIN SOCIETY.

APRIL, 20th.—At this meeting Prof. Haddon communicated a paper by Miss Glascott on "Irish Rotifera." Many species are recorded for the first time as Irish, of which twenty-five are described as new.

MAY 18th.—At this meeting, Mr. G. H. Carpenter gave a paper on the Pycnogonida collected in Torres Straits, by Prof. Haddon.

Mr. H. H. Dixon gave a paper on the method of walking among some of the Arthropoda. By means of instantaneous photographs, Mr. Dixon has investigated the walking of several insects and spiders. He finds that the limbs move together in diagonal sets; in insects the first and third legs on one side move with the second on the other; in spiders the first and third on one side with the second and fourth on the other. The antenna of an insect is moved with the first leg on the same side. In larvæ, however, as well as in the thysanure *Tomocerus*, the limbs on opposite sides move together; this is of great interest, considering that the Thysanura are believed to represent the ancestral type of insect. Some spiders appear to use their first pair of legs as tactile organs; this seems to show the origin of the structural modification of this pair of limbs in the Pedipalpi. The three limbs of the insect, or the four of the spider, are not moved all together; in some cases the hinder, and in others the foremost being first raised from the ground.

NOTES.

BOTANY.

ANCIENT FORESTS OF IRELAND.—Will some one of the contributors to the *Irish Naturalist* kindly explain the climatic conditions under which the ancient extinct forests of Ireland flourished, and also state how long since they perished? I think it would be interesting to know why it is that the name, in Irish, of the fir, of which tree the forests chiefly consisted, is not used, so far as I know, in the names of Irish places, while the names of the ash, the oak, the birch, the elm, the yew, etc., are used. Is the explanation this—that the fir forests perished long before the country was inhabited by the people who gave the present names to the townlands? The fir stumps generally rest on the top of the glacial gravel, and at the bottom of the present bogs. I know places here where the stumps are laid bare by the sea, and where the bed on which they grew is matted with their interlacing roots. The hardiest shrub could scarcely be got to keep alive now in that situation. In one of the fir stumps I counted up to eighty rings. The bark in many instances is well preserved.—O. Fallan, Ardara, Co. Donegal.

FLORA OF THE ARRAN ISLANDS.—To the *Journal of Botany* for June, Messrs. J. E. Nowers and J. G. Wells, contribute a short paper on this subject, being the result of a stay of a fortnight on the island in June, 1890. They add forty-one species to the known flora, of which the rarer are *Erodium maritimum*, *Trifolium striatum*, *Cuscuta epithymum*, *Melampyrum pratense* var. *latifolium*, *Ophrys apifera*, *Typha latifolia* var. *media*, *Botrychium lunaria*. Ten of the species are additions to the flora of district VI of "Cybele Hibernica." They record the appearance on all three islands of *Senebiera didyma*, a plant not observed by Dr. Wright or Mr. Hart on the occasion of their visits, and which is apparently replacing *S. cornopus*, and a valuable confirmation of an old record has been made by their re-discovery of *Astragalus hypoglottis* in its only Irish station, where it had not been seen since 1834.

MOSESSES.

Hypnum filicinum var. *vallisclansæ*, Brid. IN IRELAND.—Among some mosses that I received at the beginning of May from Geashill, King's County, I discovered one that I am not aware of having hitherto

been found in Ireland, and which Mr. G. A. Holt informs me is *Hypnum filicinum* var. *vallisclausæ*, Brid. It was collected by the Rev. Canon C. D. Russell, M.A., in a spring out of limestone at the eskers, near the village of Geashill. Mr. Holt writes that he has seen many forms of it in Derbyshire, where he says it is "a plant not uncommon about limestone springs and rivers." Canon Russell found but a small quantity in his locality. It will, doubtless, be discovered in other similar habitats. The appearance of the plant is more like an attenuated form of *Rannium alopecurum* than *H. filicinum*.—Rev. H. W. Lett, Aghaderg, Co. Down.

Leucobryum glaucum.—I found on the slopes of the Slieve Bloom Mountains enormous hassocks of this moss, some of them a yard or more broad, and nearly two feet high, but all obstinately barren. I believe this curious moss was collected in a fertile state near Bantry, Co. Cork, by Miss Hutchins. In structure it is highly interesting, the stem is composed of three layers, first the medulla, in which some of the cells are remarkably large, outside a ring of olive-coloured prosenchymatous, closely-placed cells, and thirdly a cortical layer several cells in thickness, similar to the ground tissue, but longer, narrowing outwards. The leaves are ovate lanceolate, often subulate, with a well-marked membranous border of single cells, wide at the base, narrowing gradually to the apex; inclining inwards from the border, and at the base, the leaf becomes several cells thick, showing rectangular cellules with well-marked intercellular cavities and pores. This remarkable structure may fulfil in some degree the functions of roots, of which I could find very little trace. On dividing one of these hassocks, the annual growths could be seen from the apex to the decayed base, and as these subside year after year, their growth must have been continued for a long space of time to enable them to attain to such dimensions.—D. McArdle, Glasnevin.

ANGIOSPERMS.

THE LESSER BURNET, *Poterium sanguisorba*, L., IN THE NORTH OF IRELAND.—This plant, newly gathered specimens of which have been submitted for verification to my friend, Mr. S. A. Stewart, has now, for the first time, been satisfactorily identified as a North of Ireland species. It occurs in a field at Glenmore, near Lisburn, Co. Antrim, where it grows in two tolerably large patches, a very short distance from each other, and it has not so far been observed in any of the neighbouring fields. The circumstance, however, of the grass of the meadow in which it is found being periodically cut before the seeds of the plant are mature, may, very probably, account for its restricted area. The leaflets of the Glenmore plant differ slightly from those of specimens I have seen from English localities, in being more elongated, and in showing less tendency towards being orbicular: otherwise there seems no difference. It has quite a luxuriant growth.

According to the "Cybele Hibernica" it is "not found in the North of Ireland." Recorded in Dr. Dickie's "Flora of Ulster," on the authority of Dr. Moore, as occurring at Ransh, Rasharkin, Co. Antrim, the name was afterwards corrected by the latter to *Sanguisorba officinalis*, and it has, therefore, been excluded by Mr. Stewart from his recently published "Flora of the North-east of Ireland."

My friend, Mr. J. G. Baker, F.R.S. ("Flora of North Yorkshire"), regards *P. sanguisorba* as a typical limestone species, having a geological distribution similar to that of *Neckera crispa*, *Fortula tortuosa*, and *Trichostomum flexicaule* amongst the mosses, "often growing plentifully in the dysgeogenous tracts, but otherwise quite rare." The Glenmore station, however, is singular in that limestone is absent, the underlying strata being of the new red sandstone formation. With this exception, the Irish distribution of the Lesser Burnet confirms what has been stated by Mr. Baker. On the very dry limestone pavements of the Aran Islands, and of Blackhead in Clare, and in Galway it is plentiful. It occurs also in Cork, Dublin, Wicklow, Kildare, and Queen's County, all limestone

regions. The station of Admiral Jones, Ballyshannon, is in close proximity to the great limestone mountains of the Ben Bulbin range, where all the mosses cited by Mr. Baker are to be found. The newly-discovered outlying locality for the plant in County Antrim is, therefore, remarkable in respect to its geological character.—John H. Davies, Lisburn.

ZOOLOGY.

INSECTS.

Rhagium bifasciatum IN CO. CORK.—Two specimens of this beetle were recently sent me from Timoleague by Miss Donovan. I believe the only previous observer who has found this “longhorn” in Co. Cork is Mr. J. M. Browne. Rev. W. F. Johnson has kindly told me that the other Irish localities are Powerscourt and Delgany in Co. Wicklow, and Newcastle, Co. Down. We may expect to see this and other species increase and spread with the planting of fir woods.—G. H. Carpenter.

AMPHIBIANS.

THE WARTY NEWT (*Molge cristata*) IN CO. DOWN.—I have found a young *Molge* among some broken stones in a dry shady area on the north side of my home. The walls of the area are six feet deep, and there was no way by which the newt once in the area could get out again. It cannot have got much to eat, which may account for its starved appearance.

Two of the same species were got in the same place last autumn, but one was smashed by my man for fear it might bite him! The old absurd ideas about them hold fast on the minds of the uneducated. I see that Thompson says he did not know the species, though Mr. Templeton had found it in Ireland.—Rev. H. W. Lett, Aghaderg, Co. Down.

BIRDS.

WHINCHAT (*Saxicola rubetra*) IN CO. SLIGO.—I have observed a considerable number of Whinchats in the vicinity of Ballymote, and on June 7th, after a long search, I found a nest containing four half-fledged young. Col. W. G. Wood-Martin, in his “History of Sligo,” does not include the whinchat in his avifauna; it seems strange that it should have been overlooked. I have neither observed the Stonechat nor the Wheatear as yet; the Whinchat appears quite to take their place at Ballymote.—H. Lyster Jameson.

ARRIVAL OF SUMMER MIGRANTS.—The following dates of arrival were observed here: Maybird, April 13th; Corncrake, April 24th; Swallow and Sand-Martin, April 25th; Swift, May 17th.—Joseph M. McBride, Westport.

THE PARROT-CROSSBILL (*Loxia curvirostra*, var. *pityopsittacus*).—In his most interesting article on “The Crossbill in Ireland” (*Irish Nat.* p. 31), Mr. R. J. Ussher remarks that “The Parrot-crossbill (var. *pityopsittacus*) was not recognised in Ireland until January, 1889 (*Zoologist*, 1889, p. 181).” About the year 1862 (I think), when I was a school-boy home for the Christmas holidays, I shot a Crossbill at Kilderry in this county, which I believe to have been of that variety. It was taken to England for preservation, but, unfortunately, with so little success, that the specimen fell to pieces in less than a year. Its beauty made an impression on my mind that has not wholly faded even now.—W. E. Hart, Falmore, Carrowmena, Co. Donegal.

WOODPECKER IN IRELAND.—It is not very generally known that Woodpeckers are seen or heard, at times, in Ireland. Sportsmen have told me that they have heard tapping, as if against trees, in silent woods, in Queen’s County and Co. Wexford. About last February, one year ago, the above-mentioned tapping was heard, and a bird was shot in Co. Kildare.—W. Connell, Carlow.

[From a description furnished by Mr. W. Connell, this bird was, no doubt, a Greater-spotted Woodpecker (*Dendrocopus major*), which occasionally appears as a rare visitor to Ireland in late autumn, but has never been found breeding in this country. The Green and the Lesser-spotted Woodpeckers have also been found, but only three or four times in Ireland, and they are far more scarce with us than the Greater-spotted Woodpecker.—A. G. More.]

GOLDEN EAGLE (*Aquila chrysaetus*) IN CO. GALWAY.—On the 24th of April I received a very fine specimen of this noble bird obtained in the vicinity of Leenane, Co. Galway. It was shot while devouring a lamb, and was exceedingly fat, measuring seven feet from tip-to-tip of wings, and three feet from beak to tail. Mr. Ussher informs me they have bred during the last few years in the immediate vicinity of where this bird was obtained.—Edward Williams, Dublin.

THE SANDGROUSE (*Syrhaptus paradoxus*) AT PORTMARNOCK.—In a conversation with Mr. Rielly, the gamekeeper in charge of the rabbit-warren at Portmarnock, near Dublin, he informed me that in the spring of 1888 a covey of Sandgrouse consisting of fifteen birds took up their residence, and remained for about six weeks on the Portmarnock sandhills, where they were strictly protected by orders of the agent, Captain Thompson, in the hope that they might remain and breed. In this, however, he was disappointed, as the birds all left by the end of June; but while on the sandhills, they used to gather in the centre of a large pasture field to spend the night.—Edward Williams, Dublin.

FORK-TAILED PETREL (*Oceanodroma leucorhoa*, Vieillot) IN CO. ANTRIM.—Mr. Sheals, the Belfast taxidermist, has drawn my attention to a Fork-tailed Petrel recently sent to him. It was picked up near Ballinderry, at the south-eastern shore of Lough Neagh, on the 27th April last, and had evidently been dead a few days. It was a mature male in good plumage, and its occurrence in Co. Antrim at this date is interesting. It would be strange if a single bird would wander so far inland, and I would be glad to know if other occurrences have been noted.—Robert Patterson, Belfast.

FULMAR (*Fulmarus glacialis*) IN CO. DONEGAL.—On May 19th I picked up on the sands between Ballyshannon and Bundoran, a specimen of this bird in a recent state. I believe this is an unusual time of year for it to occur.—H. Lyster Jameson.

IVORY GULL (*Larus eburneus*) IN DUBLIN.—In the *Zoologist* for June, Messrs. E. G. Waddilove and S. V. Cooke write that on the 19th April last they saw an Ivory Gull feeding with common and black-headed gulls on the garbage of the Liffey, just above Grattan Bridge, in Dublin.

MAMMALS.

THE MARTEN (*Mustela martes*) IN CO. WEXFORD.—A specimen of this rare animal was taken on May 1st at Coolbawn, in the Co. Wexford, by my friend Mr. Arthur Rutledge. This capture is most interesting, and sets at rest for the present all doubts as to the survival of the Marten in that part of Ireland. It is now nine or ten years since I last heard of marten being taken in the county, and that one (which was caught in a trap at Ballyhyland) was released without having been authenticated. There is, however, pretty strong circumstantial evidence that it was an actual marten. The most fortunate feature in Mr. Rutledge's capture is that his specimen is a young one, and there is, therefore, every prospect of its long continuing an object of interest to visitors to the Zoological Gardens,—the home to which Mr. Rutledge has consigned it,—where naturalists will be glad to learn that it is now to be seen in cage facing one of the entrances to the monkey-house, apparently none the worse for its passing acquaintance with the jaws of a rabbit-trap.—C. B. Moffat, Ballyhyland, Co. Wexford.

GEOLOGY.

PERFORATIONS IN CARBONIFEROUS LIMESTONE.—I have seen the perforated limestone described by Rev. Mr. Close *in situ* on the shores of Lough Corrib, near Oughterard. So far as I could observe, the holes were perpendicular to the exposed surface, but this would not necessarily mean that they were at right angles to the bedding. I was anxious to ascertain the true cause of these holes, and for this purpose I visited the Geological Museum of Queen's College, Galway. There I saw a good specimen described as an "example of the chemical and mechanical action of water on limestone." This was in Professor King's time, and I am sure he was satisfied before attaching the descriptive note to the specimen.—O. Fallon, Ardara, Co. Donegal.

I forward a specimen of perforated limestone, much of which has been turned up by the blasting operations carried on by the harbour authorities in the bed of the river here. The rock is from two to four feet under low water at spring tides, but the perforated stone seems to come from about two feet below the upper strata of rock.—Joseph M. McBride, Westport.

The geological notes on Limestone perforations in this and last issue considerably interest me. Personally I had always considered such as due to aqueous action. A few years back I remember coming on such indentations upon smooth exposed Limestone Rocks, Queen's Co. To the best of my recollection the holes varied from a little less than three-quarter inch to one and a-half inches in diameter, and from two inches to four inches in depth. In all cases they were perfectly round, gently tapering towards the bottom. Their circularity is a necessity of aqueous action, their tapering can hardly be explained by it, while their varying diameters and depths suggest forces of greater or less magnitude—possibly molluscs of different sizes? Varying depth cannot be explained by action of water, for, if due to denudation, the holes should regularly decrease or increase in depth a uniform series—or at least more uniformly than they do.—T. H. Walpole, Dublin.

I have much pleasure in forwarding for inspection a fragment of the perforated limestone. I believe that when these perforations are examined, there will be no doubt that they were formed by a mussel or other organised being, whose work is quite distinct from any effect which could be produced by inanimate agency. When speculating on what caused these curious holes, I certainly thought of the weathering action of water, etc., but I had very soon to abandon this view for the following reasons among others:—Firstly, there is too much of a "family likeness" about these holes for me to believe that they were produced otherwise than by an animal; secondly, though the rock is wrinkled, scored, and bored by the tooth of time, it is easy to distinguish the work of the intelligent little creature from the ordinary denudation of the stone; and thirdly, the holes are confined to a foot or two at the top of the stone, as if the animal could only live and work at a certain depth of water; perhaps the lower part of the stone was protected by some deposit of mud, but the scratching and weathering extend there.

For these reasons I have come to the conclusion that these strange perforations can only have been formed by some animal living in the distant past, as the boring-mussel of the present day is known to produce similar work, but perhaps on a lesser scale.

In answer to Mr. Close's question, I should say that the perforations do not seem to follow any set rule; the stone appears to have been attacked in all directions. The only rule which seems to prevail is that where the holes enter the stone horizontally, they always turn upwards soon after entry.—Owen Smith, Nobber, Co. Meath.

[We acknowledge with many thanks the receipt of specimens from Mr. Smith and Mr. McBride, and hope to return to this interesting subject in our next number.—EDS.]



GLACIAL SANDS AND GRAVELS,
GLENCULLEN CO., DUBLIN.

(From a Photograph by Mr. Jas. McNAB.)

The Irish Naturalist.

VOL. I.

AUGUST, 1892.

No. 5.

THE BIRDS OF RATHLIN ISLAND, CO. ANTRIM.

BY ROBERT PATTERSON, M.B.O.U.

(Concluded from page 73.)

- **Ægialitis hiaticula*, L.—RINGED PLOVER. Often seen about the strand and rocks. An unfledged bird was found in July, 1874, and I observed a pair in June, 1889, evidently nesting.
- Charadrius pluvialis*, L.—GOLDEN PLOVER. Frequents the beach in hard winters.
- **Vanellus vulgaris*, Bechst.—LAPWING. Common in summer on the bogs, where it breeds; not so numerous in winter.
- Streptopelia interpres*, L.—TURNSTONE. Frequently seen, both in winter and summer plumage.
- **Hæmatopus ostralegus*, L.—OYSTER-CATCHER. A few pairs are permanently resident, and breed in several places along the shore.
- Phalaropus fulicarius*, L.—GREY PHALAROPE. Has been occasionally seen swimming in Church Bay, and specimens have been shot.
- Scolopax rusticola*, L.—WOODCOCK. Only seen in severe weather; has been several times shot in winter.
- **Gallinago cœlestis*, Frenzel.—COMMON SNIPE. Abundant in all the bogs, where it breeds.
- G. gallinula*, L.—JACK SNIPE. Fairly common in winter, and observed by the light-keepers as sometimes striking against the lantern.
- Tringa alpina*, L.—DUNLIN. Frequent on the reefy shores about Church Bay in spring and summer. One in the late Mr. Gage's collection is in full breeding plumage, and I should not be surprised if this species were found breeding on the island.
- T. striata*, L.—PURPLE SANDPIPER. Seen every winter in limited numbers.
- T. canutus*, L.—KNOT. Sometimes seen, but not at all common.
- Calidris arenaria*, L.—SANDERLING. Has once occurred, a specimen being shot in Church Bay, 2nd March, 1862.
- **Totanus hypoleucus*, L.—COMMON SANDPIPER. Breeds in small numbers on the island.
- T. calidris*, COMMON REDSHANK. Frequent in winter; one was shot in August, 1844.
- Numenius arquata*, L.—CURLEW. Frequent along the shore in winter and spring.
- N. phæopus*, L.—WHIMBREL. Seen in small numbers every spring.
- Sterna dougalli*, Montagu.—ROSEATE TERN. Sometimes seen, but not nearly so frequently of late years. A fine specimen was shot in March, 1841,—a very remarkable date.
- S. fluviatilis*, Naumann—COMMON TERN. Often seen in summer along the shore.

- S. macrura**, Naumann—ARCTIC TERN. As the preceding, but not so numerous. One was caught alive in a field, October, 1860.
- Larus ridibundus**, L.—BLACK-HEADED GULL. In winter months this gull is found in great numbers, but is never seen in summer.
- L. canus**, L.—COMMON GULL. Very rarely seen; a bird in first year's plumage was shot in January, 1860.
- ***L. argentatus**, Gmelin—HERRING-GULL. Very common, and breeds in large numbers.
- ***L. fuscus**, L.—LESSER BLACK-BACKED GULL. A few pairs breed at the north side of the island every year.
- L. marinus**, L.—GREAT BLACK-BACKED GULL. Occasionally seen in winter, and specimens have been shot.
- L. glaucus**, Fab.—GLAUCOUS GULL. An immature bird was shot in February, 1867, and another in February, 1869. Since then they have been occasionally seen. A fine adult bird, in beautiful plumage, was caught alive in a net, 9th October, 1891.
- ***Rissa tridactyla**, L.—KITTIWAKE GULL. Immense numbers breed at the Bull Rock and at the north side.
- Stercorarius pomatorhinus** Temm.—POMATORHINE SKUA.—Not uncommonly seen on the pasture lands in autumn and winter. An immature bird was captured alive in a field, 22nd October, 1891.
- S. crepidatus**, Gmelin—RICHARDSON'S SKUA. Young birds are frequently seen, and have been shot. An adult was captured alive in September, 1886.
- S. parasiticus**, L.—BUFFON'S SKUA. A fine specimen in perfect plumage was taken alive at Ballygill, in May, 1860. Three others were seen at the same time.
- ***Alca torda**, L.—RAZOR-BILL.
- ***Uria triole**, L.—COMMON GUILLEMOT. { Countless numbers of both species breed on the western and northern cliffs every year. The variety known as the Ringed Guillemot is very common.
- ***U. grylle**, L.—BLACK GUILLEMOT. Breeds in moderate numbers on the cliffs, and remains all the year.
- Mergulus alle**, L.—LITTLE AUK. Occasionally seen. In December, 1862, three were picked up dead. One was caught alive on the high road in January, 1863, and since then a few have been found dead on the beach at intervals.
- ***Fratercula arctica**, L.—PUFFIN. Breeds in large numbers on the grassy slopes, usually arriving about 17th March.
- Colymbus glacialis**, L.—GREAT NORTHERN DIVER. Occasionally seen in Church Bay, and has been shot in summer plumage. Two were seen in June, 1885.
- C. septentrionalis**, L.—RED-THROATED DIVER. Sometimes seen. One was shot on Ushet Lough in the winter of 1868.
- Podiceps auritus**, L.—SCIAVONIAN GREBE. Has once occurred, in December, 1871.
- ***P. fluviatilis**, Tunstall.—LITTLE GREBE. Common in the marshes, where it breeds.
- Fulmarus glacialis**, L.—FULMAR PETREL. The only specimen seen was captured alive on the rocks near the lighthouse, 2nd September, 1889. It was an adult in good plumage.
- ***Puffinus anglorum**, Temm.—MANX SHEARWATER. Common on the north side of the island, where it breeds.
- Cymochorea leucorrhoa**, Vieillot—FORK-TAILED PETREL. After the storms of November, 1881, and October, 1891, several specimens were picked up dead on the beach.
- Procellaria pelagica**, L.—STORM PETREL. Often seen flying over the sea, and is commonly found on the beach after storms. It is said by the light-keepers to breed on the island, but Mr. Gage never found it, and I think it has been confused with the Manx Shearwater.

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

(Continued from page 67.)

GASTROPODA.

*P U L M O N A T A .*GENUS—**ARION.****Arion ater**, L.

I. II. III. IV. V. VI. VII. VIII. IX. X. XI. XII.

This, the most variable of our slugs, occurs everywhere in Ireland.

FOREIGN DISTRIBUTION.—The greater part of Europe.

Arion subfuscus, Drap.

I. II. — IV. V. — VII. VIII. IX. X. XI. XII.

As I have already pointed out (13), there are two very distinct varieties in Ireland, the one chiefly occurs in hilly districts, and the other in the plain. Thompson (15) mistook this form for a variety of *A. ater*, to which it certainly bears a strong resemblance.

Mr. Campbell and Mr. J. N. Milne have recently discovered this species near Londonderry.

FOREIGN DISTRIBUTION.—Great Britain and Continental Europe, except Spain and Portugal.

Arion hortensis, Fér.

I. II. — IV. V. — VII. VIII. IX. — XI. XII.

This species was not known to Thompson from the North of Ireland, but Mr. Praeger and myself recently found a specimen at Cultra, Co. Down. Near Dublin it is common enough in two distinct varieties, and I have also taken it on the Aran Islands. Miss Warren has sent me specimens from Co. Sligo, and Messrs. Taylor and Roebuck (14) record it from Co. Waterford.

FOREIGN DISTRIBUTION.—Great Britain, western and central Germany, France, and Italy.

Arion circumscriptus, Johnst.

I. II. — IV. V. — VII. VIII. IX. — XI. XII.

Mr. Collinge has pointed out to me that *A. circumscriptus*, a name proposed by Dr. Johnston (*Edin. New Philos. Journal*, 1828), should be substituted for *A. bourguignati*, the more recent name of Mabille. This is a much rarer slug than the last, and it has often been mistaken for it, but the white foot is a characteristic. Miss Warren obtained it in Sligo, and Mr. J. N. Milne near Londonderry.

FOREIGN DISTRIBUTION.—Great Britain, Germany, Switzerland, northern Italy, France, and Norway.

Arion intermedius, Normand.

I. — — IV. V. — — VIII. IX. — XI. XII.

I have taken this species abundantly at Raheny, near Dublin, but it is apparently rare in other counties, where I never met with more than an

occasional specimen. A dark lead-coloured specimen was obtained by the Rev. A. H. Delap near Lough Caragh, Co. Kerry.

FOREIGN DISTRIBUTION.—Great Britain, Germany, northern Italy, Switzerland, France, Norway, and the Azores. In New Zealand it also occurs, but has probably been introduced.

GENUS—**GEOMALACUS.**

Geomalacus maculosus, Allman.

I. II. — — — — — — — — — —

This is one of the most interesting of land molluscs. It has only been found among the lichens covering the huge boulders and rocks in the counties of Kerry and Cork, where however, owing to its close resemblance to the plants it lives on, it is not easily discovered.

FOREIGN DISTRIBUTION.—Absent from Great Britain and the Continent of Europe, except northern Portugal, and the north-west of Spain.

GENUS—**TESTACELLA.**

Testacella maugei, Fér.

— II. — — V. — — — — — — — — — —

This is undoubtedly a native, and has not been introduced. Messrs. Taylor and Roebuck (14) record its occurrence in Waterford, and I have had a number of specimens sent to me by Mr. F. W. Moore from the Royal Botanic Gardens, Dublin.

FOREIGN DISTRIBUTION.—South-west England and Wales, western France, Portugal, Morocco, Azores, Madeira, and Canaries.

Testacella haliotideae, F. Big.

I. II. — — — — — — — — — —

The occurrence of this species in the south of Ireland at Youghal, Co. Cork, has been known for a great many years, and it is also said to occur near Cork and at Bandon.

FOREIGN DISTRIBUTION.—Great Britain, central and southern France, Corsica, Sicily, Italy? Madeira? Gibraltar?

Testacella scutulum, Sow.

— II. — — V. — — — — — — — — — —

The claims of this form to rank as a distinct species has been clearly demonstrated by Mr. J. W. Taylor (*Journ. of Conch.*, v.), and although it seems to have a somewhat more eastern range than the other two, specimens from Co. Louth were sent to me by Miss S. Smith, and from Waterford by Mr. Garnett, junr.

FOREIGN DISTRIBUTION.—England and Scotland (chiefly east and south), Channel Isles, France, southern Spain? Italy?

GENUS—**LIMAX.**

Limax maximus, L.

I. II. — IV. V. — VII. VIII. IX. X. XI. XII.

Almost all the specimens I have met with belong to the variety *ciner-reus*, the variety *cinereo-niger* being extremely rare. It seems to be a fairly common species in most parts of the country.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Germany, Austria, Switzerland, Italy, Sicily, Corsica, Spain, Portugal, Azores, Algiers, and east coast of North America (introduced?).

***Limax flavus*, L.**

I. II. — IV. V. — — IX. — XI. —

Although abundant in Dublin cellars, this species has very rarely occurred to me in the country, and I have never met it on the west coast. Thompson (16) recorded it from the north, Messrs. Taylor and Roebuck (14) from Waterford and Cork, and Mr. Barrett-Hamilton sent me specimens from Wexford.

FOREIGN DISTRIBUTION.—Great Britain, throughout Continental Europe, Asia Minor, Algiers, Sicily, Sardinia, Azores, occurs also in many localities on the east coast of North America and Brazil, as well as in Australia and New Zealand, but it is believed to have been introduced into these regions.

***Limax marginatus*, Müller.**

I. II. III. IV. V. VI. VII. VIII. IX. X. XI. XII.

The older name has been retained here, although in most of the British works this species is described as *L. arborum* (Bouch.-Ch.) It is one of the commonest of our slugs, especially on the west coast, where it associates with *Geomalacus maculosus*. It occurs also on the Skellig rock and the Aran Islands.

FOREIGN DISTRIBUTION.—Great Britain (including Shetland Islands and Faroe Island), Scandinavia, Germany, Austria, France, Italy, Sicily, Spain, Portugal, and the Canary Islands.

GENUS—*AGRIOLIMAX*.

***Agriolimax agrestis*, L.**

I. II. III. IV. V. — VII. VIII. IX. X. XI. XII.

This slug is extremely common everywhere in Ireland. It varies considerably in colour from pure yellowish-white to chocolate-brown. A bluish form has also been taken.

FOREIGN DISTRIBUTION.—Great Britain and throughout continental Europe, Asia Minor, Persia, Siberia, Japan, Iceland, the Azores, Canary Islands, Madeira, Morocco, and Greenland. It has probably been introduced on the east coast of N. America, in Brazil, South Africa, and New Zealand.

***Agriolimax lævis*, Müller.**

I. — — IV. V. — VII. VIII. — — XI. —

This is one of our rarest slugs. It was first discovered by Mr. H. B. Rathborne in the Dublin mountains, and I have since met with it in Connemara, Killarney, Glengariff, Greystones, and in Knockdrin demesne, near Mullingar. Mr. J. N. Milne has sent it to me from Culmore, near Londonderry.

FOREIGN DISTRIBUTION.—Great Britain and throughout continental Europe. A closely allied species, *A. campestris*, is found in N. America.

GENUS—*AMALIA*.

***Amalia Sowerbyi*, Fér.**

I. II. — IV. V. — — VIII. IX. — XI. XII.

When I referred to this species on a previous occasion (12), I believed *A. carinata*, Leach, was the correct name, but as Mr. E. Collinge pointed out to me, Leach's work was not for sale until many years after Férussac had published a description of the species.

In Dublin this species is very common, but in the north it seems to be much rarer, as Thompson does not record it. It has only recently been obtained in Antrim (17), and by Mr. J. N. Milne, near Londonderry.

FOREIGN DISTRIBUTION.—This is a typically southern species, occurring besides Great Britain, only in France, Spain, Portugal, Italy, and Greece (where it is known as *A. carinata*, Risso).

***Amalia gagates*, Drap.**

I. — III. IV. V. — — VIII. IX. — XI. XII.

In some parts on the west coast this species is more common than the last, but about Dublin it is decidedly rare. Mr. Praeger has found several specimens at Cultra, Co. Down, being the first record for that county. There are two very distinct varieties in Ireland, one of which is tan-coloured and the other dark lead.

FOREIGN DISTRIBUTION.—It is widely distributed, ranging over Great Britain, Belgium, Holland, France, Spain, Portugal, Sicily, Sardinia, Egypt, Algiers, Morocco, Madeira, St. Helena, Ascension, S. Africa, (?) California, (?) Bermuda, and Brazil (possibly introduced).

(TO BE CONTINUED.)

COUNTY DUBLIN, PAST AND PRESENT.

BY PROF. GRENVILLE A. J. COLE, F.G.S.

(*Concluded from page 76.*)

V.—FROM PAST TO PRESENT.

AN enormous interval of time remains unrepresented in the deposits of the County of Dublin. Earth-movements at the close of the Carboniferous Period raised a great part of Ireland into dry land, uptilting and crumbling the shales and limestones, and again bringing the old rocks within reach of denuding forces. The form of the county must have then been far different to what it is at present; Howth and the Granite Chain, for instance, may have only in later times emerged from their covering of Upper Carboniferous strata; and in all probability the best representative of this area as it appeared at the opening of the Mesozoic era is to be found at the present time in the high table-lands of Yorkshire and the Peak.

The old order meanwhile passed away; the ancient life-forms, trilobites and the rest, gave place to animals more clearly allied to those of modern times. The north-east of Ireland, from Lurgan to Rathlin Island and from Larne to Lough Foyle, bears record of the faunas of Mesozoic times. There the Jurassic and the Chalk beds were laid down in successive seas; but we have no evidence as to how far this subsidence affected southern Ireland. When we consider how these soft strata are seen in Co. Antrim, as in the Hebrides, only as an edging peeping out from beneath eruptive masses, which have flowed over and preserved them, we may reasonably presume that they formerly extended over far wider areas, where conditions proved unfavourable for their preservation. In this way the thick flint-gravels in eastern Devon show how the Upper Cre-

taceous beds formerly extended farther west; and we have no proof that the sea in which they were deposited did not flow along the south of Wales and away into south-central Ireland. Similarly, the Antrim chalk may have had a very wide extension. A shore-line was undoubtedly near in the north and west; but, so far as Co. Dublin is concerned, it is open to anyone to assert that the uptilted Carboniferous masses again sank beneath Mesozoic seas, and were again uplifted and exposed to denudation during the volcanic period that introduced the Tertiary era.

Both the Mesozoic and Cainozoic (Tertiary) eras are, in fact, almost a blank in southern and central Ireland; and we pass directly from the Carboniferous period to some of the most recent deposits with which the geologist has to deal.

On the banks of the Dodder and its tributaries, or on the east of the Sutton strand, or at the top of the quarries near Finglas, to mention no other sections, coarse gravelly materials, often roughly stratified, are seen to form the present covering of the country. They fill the hollows worn previously in the old hard rocks, and lie unconformably across Carboniferous, Ordovician, or the slates of Howth and Bray. In some of these loose deposits marine shells may be found, of species still inhabiting the Irish seas or slightly more northern waters.¹ The once famous section at Killiney has been much affected by the railway² and by vegetation; but similar beds form the shore-line south of Bray Head, being finely exposed between that point and Greystones. Where the shells are in fair condition and the deposit fringes the present coast, we may expect it to be a "raised beach," the evidence of the last elevatory movements of the district. The officers of the Geological Survey thus state that "the gravel terrace of Sandy-mount and Merrion is probably the most southern remnant of the raised beach. Along the valley of the Liffey it merges into the alluvium of that river, forming the level ground occupied by the buildings of the University of Dublin, of Dame-street, Sackville-street, and the north-eastern suburbs of the city."³

But when recent marine shells are found at far greater heights above the sea, in the sands and gravels of the mountains themselves, it is clear that we are dealing with a different order of deposits. Dr. Scouler⁴ at an early date recorded

¹ See T. Oldham, "On the more recent geological deposits in Ireland," *G. S. D.*, iii. (1844-5), 66, 69, and 131; J. R. Kinahan, "Drift Fossils from Bohernabreena," *G. S. D.*, viii. (1858), p. 87.

² See warning by Mr. G. H. Kinahan, *G. S. I.*, iv., 118. Also for very valuable comments as to the relative ages of loose drifts, "On the classification of boulder-clays and gravels," *G. S. I.*, vi., 270, by the same author.

³ Memoir to sheets 102 and 112, 2nd edit., p. 70.

⁴ "Elevated hills of Gravel containing Marine Shells, in the County of Dublin." *G. S. D.*, i. (1838), 275.

shelly sands at a height of 90 ft. above the sea at Howth and 150 ft. at Bray; the shells at Finglas are at 200 ft. ;¹ while Mr. Kelly² observed them at 600 ft., east of the north end of Glenismole. Mr. Maxwell Close,³ in one of his most memorable papers, has given lists of species from much higher elevations.

Thus, if we follow the mountain-track leading from Rathfarnham towards Glencullen, on the opposite side of the valley to that taken by the main road, we arrive finally on the southern slope of Kilmashogue; and here, near Calbeck Castle, tough sands and gravels, cemented by carbonate of lime, appear unexpectedly, nestling in a hollow of the hills. In these beds, now much grown over, Mr. Close has found six species of marine mollusca, and this at a height of at least 1200 feet. Proceeding over the ridge of Two-Rock Mountain, we descend to the broad *col* between Glencullen village and Stepside; and here, again, gravel covers the granite, and fragmentary shells are not at all uncommon. In the old pit opposite Ballyedmonduff House, Mr. Close discovered the remains of some twenty molluscan species, at a height of almost exactly 1000 feet. This pit has now fallen in and is grass-covered; but the stratification of the gravels is well seen in Mr. Dunne's pits 100 feet or so higher up the road, where shells, in fragments about 5 mm. across, may easily be obtained by sifting.⁴

The finest section of these "sands and gravels," probably one of the grandest in the British Isles, occurs on the banks of the Cookstown River, where Glencullen narrows, some two miles up from Enniskerry (Plate 1.). Here the valley has evidently been choked with "drift" material, and the stream has cut its way down through it, and in places has reached the granite bed. The characters of the deposit here are the same as in other parts of the county. The sand consists of quartz and mica, possibly with some flint particles. The larger blocks are of very varied nature; granite boulders, abundant Carboniferous limestones, chert, Cretaceous flints, Ordovician igneous rocks like those of Tallaght and Lambay, quartz-masses, and schists from the contact-zone of the granite—these are all mingled together, some fairly rolled, others merely subangular. The percolating waters have dissolved portions of the limestones, and have in other layers firmly cemented the blocks together by redeposition of the carbonate of lime.

¹ Oldham, *G. S. D.*, iii., 66.

² "The Drift of the district about Rathfarnham," *G. S. D.*, vi., 144.

³ "The Elevated Shell-bearing Gravels near Dublin," *G. S. I.*, iv., 36; and *Geological Magazine*, 1874, p. 193.

⁴ Dr. Oldham wrote in 1844 (*G. S. D.*, iii, 70), "I have never yet failed to find fragments, at least, of shells, wherever I found clays, hard, close, blueish, gravelly clays with the gravel." This applies to the whole counties of Dublin and Wicklow.

The beds are stratified, as if laid out in water; and the rain, in cutting numerous gullies, has left rough pinnacles standing out, where the larger boulders protect the beds below.

We have reserved one of the most important characters until last; the limestone blocks, and many of those of other materials, are conspicuously marked by glacial striæ; and at Howth, Portraine, and elsewhere, these sands with scratched blocks are seen to rest on a similarly scratched floor of solid rock.¹ Land-ice, despite all other theories, seems alone competent to account for this wide-spread glaciation.

Hence here, as elsewhere, geologists have discarded the agency of huge flood-waves² in accounting for the "drift" accumulations; but they find themselves facing the difficulties presented by the theories of the "Glacial Period." Mr. Maxwell Close,³ from a prolonged study of the forms of the *roches moutonnées* and the direction of the boulder-drift, has concluded that vast ice-sheets spread outwards from the north-central plain of Ireland, one of the ice-streams splitting on the Dublin Mountains; the S.E. branch of this would be some 1120 feet thick at Bray, and capable of riding up slopes of 14° to 28°, so as to striate the surface at a height of 653 feet above the sea. Local glaciers, descending from the mountains, and remaining long after the great ice sheets, would complicate the deposits finally left behind. The clays with huge granite boulders, well seen in the new cuttings of the proposed railway near Enniskerry, are regarded as the product of land-ice; while the stratified sands and gravels are generally held to be marine deposits, formed during a period of subsidence, when icebergs carried abundant scratched blocks and distributed them on the sea-floor and in the inlets of the coast. But the fragmentary nature of the shells found in the sands indicates that they were moved from one place to another during these changes; and hence certain authors have argued that in the Dublin Mountains, and the correspondingly high area of Moel-y-Tryfaen in Caernarvonshire, the marine shells have been thrust up to their present positions by advancing ice-sheets, or have been gradually raised from the sea-floor to the surface of the vast glaciers by internal movements of the ice. The controversy is still proceeding; but the most ardent supporters of the ice-sheets admit that a considerable subsidence has occurred within the limits of the "glacial period." Considering the magnitude of past movements, a subsidence of some 1300 feet in recent times cannot be looked on as in any way more improbable than the passage of ice-sheets over our hills and dales, as maintained by the majority of geologists.

¹ This was insisted upon, before its significance was known, by Dr. Oldham (*G.S.D.*, iii, p. 132).

² See Kelly, *G.S.D.*, vi, 148.

³ "The General Glaciation of Rocks near Dublin." *G. S. I.*, i. (1864), 3; and "The General Glaciation of Ireland," *ibid.* (1865), 207.

When we know that, in Sicily, Pliocene beds are found 3000 feet above the sea, and yet 80 per cent of the molluscan species found in them still flourish in the Mediterranean, we need not recoil from seeing in the recent species on the Dublin Mountains evidence of earth-movements of one half this magnitude. But another question rises; might not the shells have been stranded in hollows of the hills during a subsidence prior to the cold period? Elevation then followed; and, the hills being brought above the snow-line, glacial deposits were formed, protecting the shell-residues in places. When the local glaciers finally began to melt away, copious deposits would be formed in all the valleys; the hills would rapidly become reduced in height when the elevatory movements ceased, and their old crags and summits would become represented by the sands and "drifts" of Glencullen and the plains. These would be full of scratched blocks from the hill-moraines, mingling with those of other glaciers from the north; stream after stream would mix and redistribute the materials. The old "pockets" of shells would be laid bare again, and would be washed down into the general river-drift. While appearing on the top of many of the glacial deposits, they might thus bear record of an older subsidence, denudation, as it must do again and again, having rearranged the deposits in the reverse order of their formation. This is naturally suggested to us by the startling resemblances between our "sands and gravels" and the ordinary material that infills the Alpine valleys. Glencullen is in this respect a model of the northern slope of the Brenner, or still more of the great Drau valley near Sachsenburg and Villach. Perhaps, to understand our "glacial epoch," we may yet have to turn from Greenland to the chains of central Europe, and to reconstruct from the drift-choked valleys the former greatness of the hills.

The winding gravel ridges, or Eskers, of which that quarried into at Balrothery and Greenhills is so beautiful an example, cannot yet be considered as explained. Mr. G. H. Kinahan has made an extended study of them, and inclines to refer them to the action of marine currents during the last slow emergence of the land.¹

Even since the country settled down into something like its present climatic conditions, the changes wrought by denudation have been enormous. The earliest Irish Elks may have wandered upon hills of shale and limestone, abutting on the granite, where now the lowland of Stepside and Cabinteely stretches. In such high ground Prof. Hull² has sought the explanation of the Scalp, the head of the valley having been

¹ "Geology of Ireland," pp. 226-231. See also "On the Drift in Ireland," *G. S. I.*, i., 191, and iii., 9, for a discussion of many types of Drift.

² *Sci. Proc. R. Dublin Soc.*, new ser., i., 11.; and "Physical Geology of Ireland," 2nd edit., p. 215. To appreciate the argument, the sections should be drawn with the same vertical and horizontal scale.

cut away after the gorge in the more resisting granite had been formed. The future has probably many changes in store for Co. Dublin; for the world is no dead planet yet. But even if the British Isles again become mere rocks in the Atlantic, other fatherlands will have risen as the home of man and his successors. *Ubi libertas, ibi patria*, is in itself a defiance to geological revolutions.

THE SHAMROCK: AN ATTEMPT TO FIX ITS SPECIES.

BY NATHANIEL COLGAN.

SOME four years ago, on the eve of Saint Patrick's Day, I chanced to become engaged in a lively discussion with some brother botanists as to the true species of the Shamrock. The general opinion of those present was clearly in favour of identifying the national badge of Ireland with the White or Dutch Clover, *Trifolium repens* of Linnæus, and this opinion was supported by the weight of all the printed authorities just then at hand. But for many reasons I had always felt somewhat doubtful about this identification, and the result of that night's discussion was not to remove my doubts, but rather to send me home impressed with the necessity of carefully studying the shamrock question in general, and of examining closely into the claims of *Trifolium repens* in particular.

The first step in the inquiry was to make myself acquainted with the literature of the subject. This step took me much farther than I had anticipated, yet as I went on I found strong encouragement to persevere; for there was obviously no crushing unanimity of authorities on the side of the White Clover. Indeed, a study of some two and a-half centuries of herbalists and botanists from Dodœus¹ and Gerarde down to Stewart and Corry,² showed that no less than four distinct shamrocks were in the field, *Trifolium pratense*, L., *Trifolium repens*, L., *Medicago lupulina*, L., and *Oxalis acetosella*, L.; and to decide between the rival claims of these, seemed a matter of national, no less than botanical interest.³

¹ *Pemptades seu Stirpium Historia*, 1616.

² *Flora of the North-east of Ireland*, 1888.

³ A critical review of the shamrock literature from Spenser and Fynes Moryson down to the present day would greatly add to the interest of this paper. But the space available here being too limited for even a catalogue of writers on the subject, the discussion must be reserved for another occasion.—N. C.

From a survey of the literature, the conclusion was irresistible that the question as to the species of the Shamrock had never been seriously studied by any competent botanist, perhaps because the subject was considered too trivial for serious treatment, perhaps because any attempt to go into it exhaustively may have been checked at the outset by the thought that the Irishman was content to wear, as the national badge, any well-marked trifoliate leaf. Such a thought, however, could only have entered the mind of an alien. Every Irishman, and every Englishman long domiciled in Ireland, well knows that the Irish peasant displays great care in the selection of his Shamrock. There is for him one true Shamrock and only one; but unfortunately for the inquiring botanist, the marks by which the Irishman, may we say, distinguishes the plant, are very largely negative. He can tell us what the Shamrock is not, rather than what it is. First of all the mystic plant is not a clover, in the next place it never flowers, and finally it refuses to grow on alien soil. It would not be true to say that my countrymen have no positive marks by which to recognize the plant, for they usually demand that it should have slender creeping stems and small neat leaves, but these characters are altogether too vague to have any botanical value.

There was clearly but one method of determining the species of the Shamrock. Specimens, each certified by a competent native authority as the true Shamrock, proper to be worn in the hat as the national badge, must be procured from various parts of Ireland on or about Saint Patrick's Day,¹ and if, as was not improbable, it should prove difficult, from examination of these necessarily undeveloped specimens, to fix the species with certainty, then each must be grown on to its flowering season and then identified.

Working on these lines, and excluding the city of Dublin and its environs from the field of inquiry, since the fine instinct which guides the Irish Celt in the discrimination of the real Shamrock becomes inevitably blunted by contact with the corrosive rationalism of cities, I collected thirteen specimens from the following eleven counties: Derry, Antrim, Armagh, Mayo, Clare, Cork, Wexford, Wicklow, Carlow, Queen's Co., and Roscommon. Shamrocks were thus secured from northern, southern, eastern, western, and central Ireland, my correspondents in the various counties taking pains to have each sample selected by a native of experience who professed to know the true plant.

Examination of these thirteen shamrocks very soon convinced me that I could not safely venture to name them off-hand, as I had never made a special study of the *Trifolia*, and had not available for comparison a sufficiently complete

¹ The 17th of March, for the information of English readers.

series of dried specimens to justify any identification based solely on an examination of leaf, and stem, and stipule. So all thirteen specimens were planted and carefully labelled with their places of origin, and flowering some two months later gave the following results: eight of the specimens turned out to be *Trifolium minus* of Smith, and the remaining five *Trifolium repens* of Linnæus. Cork, Derry, Wicklow, Queen's Co., Clare, and Wexford declared for *Trifolium minus*; Mayo, Antrim, and Roscommon for *Trifolium repens*, and Armagh and Carlow, each of which had sent two specimens, were divided on the question, one district in each county giving *T. repens* while the other gave *T. minus*.

These results were just such as I had looked for, and I have reason to expect that if the same method of inquiry were to be applied, with the same precautions, to the remaining twenty-one counties of Ireland, the preference shown for *T. minus*, Sm. would be placed in a much more striking light. From the results just recorded we are at all events fully warranted in drawing this conclusion, that the *Trifolium minus* of Smith¹ has a decidedly stronger claim to be regarded as the Shamrock of modern Ireland, than the *Trifolium repens* of Linnæus.²

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A., F.E.S.

(Continued from page 78.)

SILPHIDÆ.

- Clambus armadillo**, De G.—Mullinure, in moss—pretty common.
Agathidium lævigatum, Er.—Fairly distributed through the district.
A. rotundatum, Gyll.—Palace Demesne, in moss—rare.
Anisotoma calcarata, Er.—Mullinure, Dean's Hill, by sweeping and in flood-rubbish.
A. nigrita, Schmidt.—Mullinure, Lowry's Lough, sweeping—rare.
Necrophorus humator, Goeze.—Common throughout district, in dead birds, etc.

¹ In the earlier stages of the two species an Irish peasant might easily confound *T. minus* with *Medicago lupulina*, which has been sold in Dublin as the Shamrock.

² As I wrote these lines (May 13th) a fourteenth specimen of Shamrock reached me from Iar Connaught, S. Galway, certified by an Irish-speaking native. This specimen, then in flower, proved to be also *T. minus*, thus giving nine to five in favour of this species. A fortnight later, while in the Aran Isles, Galway Bay, I made inquiries for the true Shamrock from the Irish-speaking islanders. Several of them, searching for the plant in my presence, passed over *T. repens* as too coarse, and though apparently inclined to fix on *T. minus*, seemed so staggered by the appearance of its flowers that they gave up the search in the belief that it was too late for the Shamrock.—N. C.

- Necrophorus ruspator**, Er.—Palace Demesne, in dead bird—not as common as preceding.
N. vespillo, L.—Dean's Hill, one specimen in moss at foot of tree.
Necrodes littoralis, L.—One specimen flew into my house.
Silpha rugosa, L.—Common throughout district, in dead birds, etc.
S. dispar, Herbst.—Mullinure, one specimen—I have also taken this rare beetle sparingly on the shores of Lough Neagh.
S. atrata, L. } Common throughout district in moss,
 var. **subrotundata**, Steph. } rotten stumps, etc.
Choleva agilis, Ill.—Lowry's Lough, in moss; Cathedral Grammar School Playground.
C. velox, Spence.—Carroll's Wood, in moss—rare.
C. wilkini, Spence.—Palace Demesne, in moss—not common.
C. morio, F.—Mullinure, Drumbee, in moss—rare.
C. grandicollis, Er.—Mullinure, sweeping and in rabbit skin—pretty common.
Catops sericeus, F.—Common throughout district, in moss, etc.
Colon viennense, Herbst.—Mullinure in moss, one specimen.

SCYDMENIDÆ.

- Neuraphes elongatulus**, Müll.—Mullinure, in moss, one specimen.
Scydmaenus collaris, Müll.—Common throughout district.
Eumicrus tarsatus, Müll.—Mullinure, in moss, one specimen.

PSELAPHIDÆ.

- Pselaphus heisei**, Herbst.—Common throughout district, in moss.
P. dresdensis, Herbst.—Mullinure, in flood-rubbish; Loughnashade and Drummanmore Lake, in moss—the last mentioned locality is the most productive. I got five specimens in one bag of moss from thence. It appears to be extremely rare.—Fowler. *Brit. Col.* vol. iii., p. 85.
Tychus niger, Payk.
Bythinus puncticollis, Denny.
Bryaxis fossulata, Reich.
B. juncorum, Leach.
Euplectus ambiguus, Reich. } Common throughout the district, in moss.

TRICHOPTERYGIDÆ.

- Trichopteryx atomaria**, De G.—Common throughout district, in moss.
T. brevipennis, Er.—Mullinure, in moss—not common.
Ptenidium fuscicorne, Er.—Mullinure, in moss and flood-rubbish—pretty common.
P. nitidum, Heer.—Mullinure, in moss—pretty common.
P. evanescens, Marsh.—Mullinure, in moss—not common.

COCCINELLIDÆ.

- Hippodamia tredecimpunctata**, L.—Mullinure, Drummanbeg Lake, sweeping—rare.
Adalia oblitterata, L.—Mullinure, Palace Demesne, in moss—not common.
Anatis ocellata, L.—Drummanmore, one specimen in moss.
Coccinella decempunctata, L.
C. septempunctata, L. } Common throughout district.
Halysia quattuordecimguttata, L.—Mullinure, Folly, in moss—pretty common.
H. octodecimguttata, L.—Grange, Mullinure, by sweeping—rare.

- H. vigintiduopunctata**, L.—Common throughout district, in moss and by sweeping.
Scymnus suturalis, Thnb. } Common throughout district, in moss.
S. testaceus, Mots. }
Coccidula rufa, Herbst.—Common throughout district, by sweeping and in moss.

HISTERIDÆ.

- Hister neglectus**, Germ.—Cathedral Grammar School playground, one specimen.
H. carbonarius, Ill.—Common throughout district in dung, moss, etc.
Acritus minutus, Herbst.—In hot bed—pretty common.

MICROPEPLIDÆ.

- Micropeplus staphylinoides**, Marsh.—Palace Demesne, in moss—rare.

NITIDULIDÆ.

- Brachypterus pubescens**, Er. } Common throughout district by
B. urticae, Kug. } sweeping,
Cercus pedicularius, L.—Common throughout district, by sweeping.
C. rufilabris, Latr.—Lowry's Lough, Mullinure, by sweeping—uncommon.
Epurea florea, Er.—Common throughout district, by sweeping and beating whitethorn.
Meligethes lumbaris, Sturm.—Lowry's Lough, one specimen by sweeping.
M. æneus, F.—Common throughout district, in moss and by sweeping.
M. viduatus, Sturm.—Mullinure, Folly, by sweeping—pretty common.
M. flavipes, Sturm.—Mullinure, Kildarton, Drummanbeg—sweeping and flood-rubbish.
M. picipes, Sturm.—Mullinure, Loughgall—sweeping and in flood-rubbish.
Rhizophagus cribratus, Gyll. } Palace Demesne, in moss—not common.
R. perforatus, Er. }
R. parallellocollis, Er.—A single specimen flew into the Cathedral Grammar Schoolroom.
R. dispar, Gyll.—Palace Demesne, in moss—pretty common.

MONOTOMIDÆ.

- Monotoma picipes**, Herbst.—Lowry's Lough, by sweeping; in a hot-bed—plentiful.

LATHRIDIIDÆ.

- Lathridius lardarius**, De G.
Cononimus nodifer, Westw. } Common throughout district—in moss
Encimus minutus, L. } and by sweeping.
E. transversus, Ol. }
Cartodere filiformis, Gyll.
Corticaria denticulata, Gyll.—Mullinure, in flood rubbish, Lowry's Lough—rare.
C. serrata, Payk.—Cathedral Grammar School Playground—rare.
C. elongata, Gyll.—Mullinure, sweeping—rare.
Melanophalma gibbosa, Herbst. } Common throughout district, in
M. fuscula, Maanh. } moss and by sweeping.

BYTURIDÆ.

- Byturus tomentosus**, F.—Lowry's Lough, sweeping—rare.

(TO BE CONTINUED.)

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

Two Silver Foxes have been presented to the collections by H. A. Lett, Esq.; a cockatoo by Miss Norman; three Quails by H. M. Burton, Esq., and a Long-eared Owl by R. Brennan, Esq. A male Yak has been deposited in the gardens by Mr. W. Cross, and a Black-headed Lemur by P. Mahony, Esq. Thirty-four monkeys and a Japanese Salamander have been purchased, but the amphibian has unfortunately died.

A portrait of the late Dr. R. Ball, who was Hon. Secretary to the Society from 1837 to 1857, has been presented by Mrs. Ball.

DUBLIN MICROSCOPICAL CLUB.

JUNE 16th.—The Club met at Mr. F. W. Moore's, who showed a liverwort, *Cephalozia francisci*, collected at Howth by Mr. McArdle. This species is probably new to Ireland. In Moore's "Irish Hepaticæ," it is stated that it had been found near Bantry by Miss Hutchins. Dr. Spruce, to whom the specimen exhibited had been submitted, states that it was the first true *Cephalozia francisci* which he had seen from Ireland. Those sent from the Bantry locality were all forms of *C. divaricata*, and he considered that Miss Hutchins' plant was also that species. Mr. McArdle's discovery, therefore, forms an important and interesting addition to the flora of Co. Dublin, if not of Ireland.

Dr. E. J. McWeeney showed a *Bacillus* isolated from measles.

Professor A. C. Haddon showed specimens of the foraminifer *Biloculina depressa* from the east and west coasts of Ireland. Those from the latter locality were much the larger.

Professor Cole exhibited sections of *Hemitrypa Hibernica*, McCoy, prepared from fine specimens collected by Mr. R. Kirwan in Co. Galway. It has been stated of late that *Hemitrypa* is merely a *Fenestella* encrusted by another organism; but these specimens suggest that it may be necessary to re-establish Phillips's *Hemitrypa* as a genus.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 18th.—Excursion to Islandmagee and the Gobbins. The party, fifty in number, took train to Ballycarry, and drove thence some two miles, and then walked to the shore south of the Gobbins, where the Secretaries announced that a prize would be given for the best collection of flowering plants made during the day. Some of the members visited the outcrop of Chalk and Greensand to the southward, and the whole party then walked along the top of the magnificent range of cliffs to Port Muck and thence to Larne, where tea was provided, and the railway brought them back to town. Of plants, the best species collected was *Epilobium angustifolium*; the prize for best collection fell to Miss Rea, whose series numbered 111 species. The ornithologists found interest in the large colonies of Herring Gulls that tenanted the cliffs, and in the nest and young of a pair of Peregrine Falcons, were plainly visible at one point of the path. The best find of the entomologists was the male and female of the pepper-and-salt moth (*Amphidasys betularia*).

JUNE 24th and 25th.—Special two-day mountain-climbing excursion to the Mourne Mountains. The members took first train to Newcastle, and drove to Trassey Bridge, where the vehicles were left. The route lay up the glen of the Trassey Burn to the Hare's Gap, and on to the Diamond Rocks on the southern slope of Slieve-na-glough, where quarrymen were in waiting to blast the hard rock and break up the material obtained. Good crystals of smoky quartz, orthoclase, mica, and topaz were obtained, and fragments of beryl. The ascent of Slieve Bearnagh

(2,394 feet), was next accomplished, and subsequently Slieve Meel More (2,237) was scaled, and an interesting bed of massive amethyst visited, which is undescribed in the maps and memoirs of the Geological Survey. The route then lay along the slopes of Slieve Meel Beg and past Lough Shannagh to the Deer's Meadow, where the carriages were in waiting to convey the party to Kilkeel in time for late dinner. The best plants found during the day were *Listera cordata*, *Juniperus nana*, *Salix herbacea*, *Vaccinium vitis-idaea*, *Lycopodium alpinum*. Of beetles, *Carabus catenulatus* was taken at Hare's Gap, and *C. arvensis* near the summit of Slieve Bearnagh. In the department of lepidoptera, *Eupithecia pumilata*, *E. minutata*, and *E. satyrata* var. *callunaria* were observed on the mountains; and *Microdia schulziana*, *Acidalia marginepunctata*, and *Eupithecia constrictata* on the lower grounds at Kilkeel. Next morning the members drove to Colligan Bridge, at the base of Slieve Bingian. Here the weather became so bad, with heavy mist and pouring rain, that the majority of the party decided to proceed by road to Newcastle, only three volunteering for the mountain walk. The three mountaineers pushed up the Silent Valley for several miles, and then climbed to the saddle between Slieve Bingian and Slieve Lamagan. The weather was so excessively bad that two more members dropped off here, leaving the secretary (Mr. Praeger) alone to finish the programme. The solitary representative of the club visited the topmost crags of Slieve Bingian in a whole gale, with torrents of rain and heavy mist, and then descended with all speed. The party reassembled at Newcastle, and the weather cleared up, and a pleasant and instructive afternoon was spent in the woods of Donard Lodge and on the sand-dunes; in the evening the return to Belfast was made. Records of the second day: Botany—*Lobelia dortmanna*, *Drosera intermedia*, *Rhyncospora alba*—Silent Valley; *Salix herbacea*, *Vaccinium vitis-idaea*, *Cryptogamne crispa*—Slieve Bingian; *Isoetes lacustris*, *Lobelia*—Blue Lough. Lepidoptera—same *Eupithecia* as on previous day; *Bupalus piniaria*, common in fir woods; *Scodion belgaria*, *Ellopi fasciaria*. Coleoptera—*Dascillus cervinus*, *Telephorus pellucidus*, *Rhagium inquisitor*. The geological specimens obtained were some quartz crystals and good specimens of felspar.

DUBLIN NATURALISTS' FIELD CLUB.

The excursion to Leixlip on June 18th, did not yield many species, as the pace was necessarily too fast to allow of adequate searching. It proved useful, however, in directing attention to an excellent piece of collecting ground close to Leixlip M. G. W. Railway Station. The area in question contains several swampy places which are literally covered with *Pinguicula vulgaris*, *Parnassia palustris*, and *Anagallis tenella*; *Listera ovata*, *Orchis latifolia*, *Gymnadenia conopsea*, and *Orchis pyramidalis* are also abundant. In the pools, *Alisma ranunculoides* was seen—a plant stated in the City and County Guide, 1879, to be abundant in Dublin and Wicklow, but which is certainly very seldom observed. The drier spots abounded in *Poterium sanguisorba*. The President (Dr. McWeeney), Dr. Scharff, and Mr. D. McArdle paid a second visit (on July 2nd) to this favoured spot, and the former obtained the following Fungi:—*Periza* (*Hymenoscypha*) *cynthoidea*, Bull. on dead *Centaurea* stems; *Puccinia moliniae*, Tul. æcidiospores and spermogonia on *Orchis latifolia* (the spermogonia were well developed on plants which had not yet opened their flowers); *Uromyces parnassiae*, D. C., Æcidiospores only found—abundantly. The first Irish record of this rare species.

The excursion to Lough Derevaragh, Co. Westmeath, on July 16th, was poorly attended on account of the wet morning, but the seven members who started were well repaid by a fine day. Train was taken to Mullyfarnham, and a walk thence through the demesne of Donore (by kind permission of P. Nugent, Esq.) brought the party to the shores of the Lough, which proved an excellent collecting-ground. Dr. E. J. McWeeney and Mr. D. McArdle collected botanical specimens. Among

the phanerogams the principal find was *Ophrys apifera*, of which about half-a-dozen plants were observed on a low-lying grassy plot of ground beside the lake. *Geranium dissectum*, *Conium maculatum*, *Molinia cærulea* and *Aira cæspitosa* were also noted; but the lake shores were devoid of many marsh plants which regularly occur in such situations near Dublin, as *Pinguicula vulgaris* and *Parnassia palustris*. In addition to *Ophrys*, the plot of ground above mentioned contained *Orchis maculata*, *O. pyramidalis*, and *Listera ovata*. Of fungi, the following amongst other species were observed and identified by Dr. McWeeney:—*Agaricus* (*Amanita*) *strobiliformis*, Fr. one magnificent and perfectly typical specimen found in a small wood beside the lake; *A. (Leptania) campopus*, Fr., amongst grass in a swamp beside the lake; *A. (Panuolus) phalenarum*, Fr.; *A. (Prathyrella) disseminatus*, Fr.; *Phallus impudicus*, L., in the little wood beside the lake; *Merulius corium*, Fr.; *Tremella mesentinea*, Retz.; *Puccinia bullata*, Pers., uredospores on *Conium maculatum*; *Puccinia* sp. on *Angelica sylvestris*; *P. primula*, Grev., uredo and teleutospores; *P. veronicarum*, D.C., on *V. montana*; *P. violarum*, Link; *Triphragmium ulmariae*, Link, both kinds of uredospores and teleutospores; *Calosporium euphrasie*, Lev., on *Euphrasia*.

Among insects the only noteworthy butterfly observed was *Epinephile hyperanthus*, L., which occurred in swarms. The dragon-fly, *Agrion puella*, and the caddis *Mystacides longicornis*, L., abounded. Of the hemiptera, *Calocoris sexguttatus*, F., was taken in the wood, whilst *Salda littoralis*, L., and *Rhopalotomus ater*, L., were numerous on the margin of the water. The hunting-spider, *Lycosa palustris*, L., was also plentiful; another spider of the same family, *Tarentula andrenivora*, Walck, was taken for the first time in Ireland.

CORK NATURALISTS' FIELD CLUB.

The uncertain weather of the past weeks, combined with the fact of many members being on holidays, has had the effect of making the excursions very small, but several have been taken.

JUNE 15TH.—The Club visited Ardrum (Sir G. Colthurst's seat), on the Coachford line, a very interesting district for botanists.

JUNE 29TH.—The Club visited Killeagh, for Glenbowe Woods. The scenery of the glen several miles long, resembles, in many parts, that of the Dargle, in Co. Wicklow, and deserves to be better known; there is a field for much further research, of which members intend to avail themselves.

JULY 9TH.—A wet morning deterred many, but a party of twelve visited the beautiful grounds of Fota (A. H. Smith-Barry, Esq.), where there is a splendid collection of pines and firs from all parts of the world, the characteristics of which were pointed out by Mr. Osborne, the Steward.

NOTES.

BOTANY.

PHANEROGAMS.

Tamus communis, L. IN SLIGO. I suppose this cannot be regarded as an Irish plant, but I found it well established in Slish wood on the shore of Lough Gill, in July this year. There appear to be no records of its Irish distribution. Can any of your readers tell me if it grows in the Killarney woods which resemble those of Lough Gill?—Rev C. H. Waddell, Saintfield, Co. Down.

Neotinea intacta IN CO. CLARE. In the *Journal of Botany* for June, Mr. H. C. Levinge gives the result of a search for the rare orchid in the Burren district, Co. Clare. He states that he found it extending somewhat sparingly from about six miles west to about three miles east of the

town of Ballyvaughan, and he gathered it also at Corry's station, Glanquin, but failed to find it in its old habitat at Castle Taylor, Co. Galway. Mr. Levinge describes the flowers as creamy white, rather than pink. The latter part of the papers mentions stations for a number of the rarer western species.

THE FLORA OF CO. WEXFORD. The July number of the *Journal of Botany* contains a paper by Messrs. Barrett-Hamilton and Moffat, in which they add a number of new localities to the lists of Wexford plants already published in that *Journal* by Miss Glascott and themselves. Five of those now published are additions to district IV. of "Cybele Hibernica":—*Aquilegia vulgaris*, *Ranunculus penicillatus*, *Stachys betonica*, *Utricularia minor*, and *Hymenophyllum tunbridgense*.

Rubus chamaemorus AS AN IRISH PLANT. Mr. A. G. More, in the *Journal of Botany* for June, summarizes the information available regarding the unverified record of Prof. Murphy for this plant on the Sperrin Mountains, and urges further search for it in its only recorded Irish station.

ZOOLOGY.

INSECTS.

COLEOPTERA IN CO. DUBLIN. Collecting in Glencullen on a warm day about the middle of last month (June), I took examples of the following: *Bolitobius lunulatus*, *Stenus similis*, *S. bimaculatus*, *Dianöus cærulescens*, *Throscus dermestoides*, *Strongylus fervidus*, *Priobium castaneum*, *Mesites tardyi*, and single specimens of the rare *Megatoma undata*, and *Abdera bifasciata*. At Barnaculla a few days later, I took *Cychrus rostratus*, *Leistus rufescens*, *Telephorus bicolor*, *Malldinus punctatus*, *Ragonycha pallida*, *R. testacea*, *Grammoptera tabacicolor*, *Alophus triguttatus* and *Orchestes ruscii*. The last named I have since taken in greater numbers at Leixlip.—H. J. Cuthbert, Blackrock.

COLEOPTERA OF THE HOLYWOOD DISTRICT. In connection with the Cultra Field Club, a small local organization, a prize was offered by the Rev. W. F. Johnson for the best collection of beetles made by members, in the neighbourhood of Holywood, during the months of February, March, and April last. A few notes of the rarer species obtained by the two competitors (ourselves), may be of interest as showing what may be done by novices in a short period, in spite of an unfavourable spring and the limited time at our disposal. All the species were obtained within a four mile radius of Holywood; the area thus enclosed offers a considerable variety of habitat, including salt-marshes, woods, and strong heaths. The determinations were all made by Mr. Johnson, to whom we are much indebted for his painstaking kindness.

The total number of species found was 165. Five of these are additions to the Irish list, namely—*Bradycellus distinctus*, Stormount, under moss; *Harpalus consentaneus*, Marino, under dead hen; *Coelambus parallelogrammus*, People's Park, in open drain; *Alcocharya grisea*, Craigavad, among seaweed; *Quedius puncticollis*, Holywood, under moss. Of the other species the following are the more noteworthy:—*Notiophilus substriatus*, Holywood and Clandeboye; *Cychrus rostratus*, Craiggauntlet and Clandeboye; *Leistus fulvibarbis* Craigavad; *L. rufescens*, Clandeboye; *Calathus piceus*, Holywood and Clandeboye; *Pterostichus strenuus*, Holywood; *Amara fulva*, Marino; *A. acuminata*, Craigavad; *A. lunicollis*, Cultra Wood; *Bembidium mannerheimi*, Holywood and Stormount; *B. rufescens*, Marino; *Hydroporus lepidus*, Holywood; *H. pubescens*, (melanocephalus), People's Park; *Agabus guttatus*, Holywood; *Sphaeridium marginatum*, Cultra Wood; *Cereyon littoralis*, Cultra and Craigavad; *Alcocharya bipunctata*, Stormount; *A. algarum*, Craigavad (only other record near Dublin); *A. nitida*, Holywood; *Tachinus subterraneus*, Cairngever; *T. subterraneus*, var. *bicolor*, Cultra Wood; *Megacronus analis*, Holywood and Craigavad; *Quedius fulgidus*, Holywood; *Q. cinctus* (empressus), Holywood and Craigavad; *Q. tristis*, Cultra Wood; *Ocypus morio*, Clandeboye and Stormount; *Philonthus splendens*, Holywood; *P.*

intermedius, Holywood; *P. aeneus*, Cultra; *P. succicola*, Holywood (this specimen is an interesting variety, having only three dorsal punctures on the thorax instead of four, and the whole thorax being finely punctured, instead of smooth); *P. addendus*, Holywood; *P. ebeninus*, Craigavad; *Oxytelus tetracarinatus*, Holywood; *Homalium excavatum*, Holywood; *Micropeplus porcatus*, Holywood (only other records near Belfast (Haliday) and Portmarnock); *Aphodius depressus*, Holywood; *Orchestes quercus*, Cultra Wood; *Eurrrhinus scirpi*, Holywood; *Liosoma ovatum*, Holywood and Clondeboy; *Exomias araneiformis* (*Barypeithes pellucidus*), Holywood; *Liophleus nubilis*, Cultra; *Barynotus obscurus*, Holywood; *B. schönherri*, Cultra; *B. elevatus*, Craigavad.—W. H. Patterson, junr. and W. D. Donnan, Holywood, Co. Down.

ABNORMAL PHILONTHI. Among some beetles sent to me for identification by Mr. W. D. Donnan of Holywood, was a large *Philonthus* which greatly puzzled me, I therefore sent it to Canon Fowler and subsequently to Dr. D. Sharp. They decided that it was an abnormal specimen of *Philonthus succicola*. It is a very curious looking beetle, as it has three punctures in the dorsal series on one side and four on the other, and has moreover the whole thorax very finely and closely punctured instead of being perfectly smooth. The correspondence about this beetle caused me to mention to Dr. Sharp that I had a curious specimen of *Ph. varians* which I had taken at Bundoran in 1890. At his request I sent it to him and he returned it telling me that it was a very remarkable specimen, as it had a puncture short in the dorsal series on both sides of the thorax, a variation which he had never seen in any European specimen before. Together with this, I sent Dr. Sharp another specimen of *Ph. varians* which I had taken in a hotbed in my garden. It was remarkable for the absence of colour in the elytra which were of a dingy white. I suggested that this probably arose from immaturity but Dr. Sharp considered that there must have been some other cause than mere immaturity to produce such a curious absence of colour. The proper colour of the elytra is black with a blotch near the shoulder.—Rev. W. F. Johnson, Armagh.

BIRDS.

WOOD WARBLER (*Phylloscopus sibilatrix*) IN CO. WEXFORD. On July 1st a bird-note unfamiliar to my ears—"wicka wicka wee guee guee" (with an emphasis on the "wee")—impatiently and repeatedly uttered above my head, caused me to look up and behold a bird which but for its perfectly different song I should have taken for the Willow Wren, busily hopping through the branches of a sycamore, and continuing its monotonous melody with scarcely a break. Though I did not get a good view of its upper surface I have no hesitation in setting it down as the Wood Warbler (*Phylloscopus sibilatrix*), a bird which I have not previously seen in this locality, when attention was specially directed to the point, it seemed to me somewhat large for *P. trochilus*, and to possess in proportion a shorter tail; but these differences are easily imagined, and it is on the strength of its song that I identify the bird. Has the Wood Warbler been previously seen in the county?—C. B. Moffat.

WOODPECKER IN IRELAND. Mr. W. Connell's communication (p. 82) is interesting; but the presence of Woodpeckers in a locality must not always be inferred from the sound of "tapping against trees in silent woods." I have heard this (in Co. Wexford) many times; but in the majority of such cases the unseen tapper is in fact the Great Titmouse, whose stout back, backed by his sturdy frame, can deal a series of surprisingly resonant blows against growing timber, in the bird's keen pursuit of insect prey. It is generally in winter or late autumn that this sometimes misleading, but always pleasant sound, attracts my attention, principally, I think, among beech trees. I may add that all our titmice act "Woodpecker" to a certain extent, particularly in severe weather, but *Parus major* is audible to a far greater distance than any of the smaller species inhabiting this country.—C. B. Moffat, Ballyhyland, Co. Wexford.

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No. 6.

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

(Continued from page 90.)

GASTROPODA.

PULMONATA.

GENUS—**HELIX**.

Helix pygmæa, Drap.

I. — III. IV. V. VI. VII. VIII. — X. XI. XII.

This very minute species has a very wide distribution, but owing to its small size is not easily detected.

FOREIGN DISTRIBUTION.—Great Britain, Continental Europe, Siberia, Sicily, Madeira, and throughout North America.

Helix rotundata, Müller.

I. II. — IV. V. — VII. VIII. IX. X. XI. XII.

This species is extremely common in Ireland, and one can hardly turn over a stone without finding it.

FOREIGN DISTRIBUTION.—It ranges probably over the whole of Continental Europe and Great Britain, Sicily, Corsica, Azores, Madeira. A closely allied species, *H. rudrata*, probably lived in England during the glacial period, but is now confined to more northern latitudes and the Alps.

Helix rupestris, Drap.

I. II. — — V. — VII. VIII. IX. — XI. —

Thompson (15) refers to this species under the name of *H. umbilicata* (Mont.), and mentions that it is commonly distributed throughout the southern three-fourths of Ireland, but Mr. Milne (10) found it equally abundant at Rockville, in Donegal. It is very common on the Aran Islands, Co. Galway.

FOREIGN DISTRIBUTION.—Great Britain, central and southern Europe, Portugal, Sicily, Syria, Tunis, and Algiers.

Helix pulchella, Müll.

I. II. — IV. V. — VII. VIII. IX. — — XII.

Commonly distributed in the greater part of Ireland chiefly in dry places. The ribbed variety (*H. costata*, Müll), is generally found in company with the type.

FOREIGN DISTRIBUTION.—Great Britain, continental Europe, Sicily, Corsica, Azores, Madeira, Canaries, St. Helena, Siberia, and North America.

Helix aculeata, Müll.

I. II. — IV. V. VI. — VIII. IX. — — XII.

Like *H. pygmaea*, whose habitat it shares, this species is most easily obtained by shaking fallen leaves over a sieve and examining the residue carefully on a piece of white paper.

FOREIGN DISTRIBUTION.—Great Britain, Germany, France, southern Scandinavia, Austria, Switzerland, Italy, Spain, Portugal, Algiers, Morocco, Corsica, Sicily, and the Azores.

Helix lamellata, Jeffr.

I. II. III. IV. — — — — — XII.

Thompson (15) has recorded this beautiful species from Co. Down, Killarney, and the Glen of the Downs (Wicklow), and I myself found it at Glengariff and Killarney.

FOREIGN DISTRIBUTION.—Its very limited foreign distribution points to the probability of its having originated somewhere within the British Islands. It occurs in Scotland, North of England (also in the south during the glacial period), northern Germany, Denmark, and southern Sweden.

Helix hispida, Linn.

I. II. — IV. V. VI. VII. VIII. IX. X. XI. XII.

The shell of this species is very variable in size as well as in the width of the umbilicus; so much so that it is by many authorities subdivided into a number of species. The variety *nana* (Jeffr.) is regarded as a distinct species by Westerlund, whilst the variety *concinna* (Jeffr.), which Mr. Jeffreys himself was inclined to look upon as a distinct species, is treated as a variety by all continental authorities. *H. hispida* and its variety *concinna* are commonly distributed in Ireland.

FOREIGN DISTRIBUTION.—Great Britain, throughout continental Europe, Sicily, Algiers, Siberia, Nova Scotia (introduced)?

Helix rufescens, Penn.

I. II. — IV. V. — VII. VIII. IX. X. XI. XII.

This is an extremely variable form, and like the last is divided into a number of separate species by some of the continental authorities. Dr. Westerlund recognises three British species belonging to this type, viz., *H. rufescens* (Penn.), *H. striolata* (C. Pfr.), and *H. abludens* (Loc.). The latter is said to be found only in Dublin, Jersey, and Boulogne in the north of France.

In the neighbourhood of Dublin this species is very common, and it seems to be generally distributed in Ireland, except in the north-east. Milne (10) found it in the Co. Donegal and Achill Island.

FOREIGN DISTRIBUTION.—This is difficult to determine on account of the difference of opinion as to the limits of the species. *H. rufescens* (Penn.), Great Britain, Belgium, N. W. France. *H. striolata* (C. Pfr.), Great Britain, France, W. Germany. *H. abludens* (Loc.), Jersey and N. France. *H. montana* (Stud.), Switzerland, south Germany, France, and Austria.

Helix sericea, Drap.

I. II — IV. V. — — — IX. — — XII.

I quite agree with Thompson (15) that the Irish specimens are not referable to *H. granulata*, Alder. They are somewhat intermediate between the typical *H. sericea* and *H. granulata*, the latter being probably only an extreme variety of the other.

FOREIGN DISTRIBUTION.—Great Britain, France, south-west Germany, Switzerland, Italy, Spain, Portugal, and Algiers.

Helix fusca, Mont.

I. II. — IV. V. VI. VII. VIII. — X. — XII.

This species has been taken in the more mountainous districts of Ireland.

FOREIGN DISTRIBUTION.—This is rather remarkable, the species being a decidedly western European form which has hitherto only been found in the south, south-west, and north of England, Wales, and Scotland. Beyond Great Britain it is known only from the south-west of France.

(Helix cantiana, Mont.)

In Walsh and Whitelaw's "History of Dublin," this species is mentioned as occurring in the neighbourhood of Dublin, and Mr. Taylor received specimens which were said to have been taken in Stillorgan Park, near Dublin, but nevertheless I am disinclined to admit it in the Irish list, as both Mr. Redding and myself scoured every corner of the park, without being able to find a trace of the shell. It has not been recorded from any other Irish locality.

FOREIGN DISTRIBUTION.—England (chiefly east), near Bremen (Germany), Belgium, and north-west France.

Helix arbustorum, Linn.

I? — — — V? — — — — — XII.

Thompson (15) found this species abundantly in Antrim, and sparingly in Down, but I am doubtful whether the other Irish localities mentioned by him should be regarded as properly authenticated, Irish collectors not being familiar with the look of this species. The late Mr. Warren had young *H. aspersa* in his collection marked *H. arbustorum*, and no recent observer has been able to find the species anywhere near Dublin.

FOREIGN DISTRIBUTION.—Great Britain, Germany, France, the Alps up to 7,000 feet, northern Italy, Pyrennees, Scandinavia, Austria, Transylvania.

Helix pisana, Müll.

— — — — V. — — — — —

This species inhabits a short track along the coast, between Drogheda (Co. Meath) and the village of Rush (Co. Dublin), and Miss Smith has also found it a few miles north of the Boyne, in Louth. It is absent from the rest of Ireland, the record of Mr. Andrews (15) in Kerry not having been confirmed by later observers.

FOREIGN DISTRIBUTION.—South-west England and Wales, central and southern France, Spain, Portugal, Morocco, Algiers, Tunis, Egypt, Syria, Corsica, Italy, Istria, Greece, Turkey, Cyprus, Madeira, Canaries, and Azores.

Helix virgata, Da Costa.

I. II. III. IV. V. — VII. VIII. — — — XII.

This very variable species is extremely common in many localities round the coast, and after a shower of rain it sometimes appears in such unusual numbers, having previously been hidden in the ground, that it has given rise to a popular belief that it has "rained snails."

FOREIGN DISTRIBUTION.—Great Britain (as far north as the south of Scotland), France, Italy, Dalmatia, Portugal, Algiers, Sicily, and Corsica.

Helix intersecta, Poir.

I. II. III. IV. V. — — — IX. — — XII.

H. caperata, Mont. is a more recent name for the same species. In the Co. Dublin, on the limestone of Portmarnock, as well as on the granite of

Dundrum, it is plentiful. Thompson (15) never met with this species in the north, but records it from Kildare, Queen's County, and Cork.

FOREIGN DISTRIBUTION.—Great Britain, Germany (only at Weimar and the Island of Alsen), Belgium, France, north of Spain and Portugal, and Madeira.

***Helix ericetorum*, Müller.**

I. II. III. IV. V. VI. VII. VIII. IX. — XI. XII.

On the west coast this species is very abundant in many localities, and it varies greatly in size and colour. The Irish form differs so much from the continental one, that Dr. Westerlund, to whom I sent specimens from the Aran Islands, referred them to a new species, *H. lampra*. I quite agree, however, with Prof. Boettger who looks upon the Irish form as a variety of the typical *H. ericetorum*.

FOREIGN DISTRIBUTION.—Great Britain, France, central and western Germany, Switzerland, Corsica, Spain, Portugal, north Italy, Turkey, and Algiers.

***Helix acuta*, Müller.**

I. II. — IV. V. — VII. VIII. IX. — XI. XII.

Thompson (15) and also many English writers place this species under the genus *Bulinus*, but its habits and the structure of the animal and shell are much more *Helix*-like, and it is classed under that genus by the best continental authorities. It is very common in many localities along the coast, especially on the north side of Dublin.

FOREIGN DISTRIBUTION.—Great Britain, France, Italy, Spain, Portugal, Morocco, Algiers, Sicily, Malta, Corsica, Cyprus and Crimea.

***Helix nemoralis*, Müller.**

I. II. III. IV. V. VI. VII. VIII. IX. X. XI. XII.

This is one of the commonest and also one of the most beautiful of Irish mollusca. Yellow or red, with or without bands, are the commonest varieties. In many places on the west coast there is a race of very large forms of this species, for instance on Valentia and on the Aran Islands, and a now extinct race of large and very thick-shelled white forms lived not long ago at Roundstone in Connemara.

FOREIGN DISTRIBUTION.—Great Britain, Germany, southern Scandinavia, Illyria, Dalmatia, Western Austria, Switzerland, north Italy, France, Spain and Portugal.

***Helix hortensis*, Müller.**

I.? — III.? IV. V. — VII. VIII. — X. XI.? XII.

This is much less common than *H. nemoralis*. The *H. hybrida*, Poir. mentioned by Thompson (15) must be looked upon as a variety of this species.

FOREIGN DISTRIBUTION.—Great Britain, France, Portugal, Germany, central and southern Scandinavia, Iceland, Faroe and Shetland Isles, Finland, Bohemia, Austria, Switzerland, Greenland, and north eastern portion of North America; also on islands between Newfoundland and Cape Cod.

***Helix aspersa*, Müller.**

I. II. — IV. V. — VII. VIII. IX. X. XI. XII.

Although in southern Europe we find several well-marked varieties, this species remains remarkably constant in its characters in Ireland. It is the largest of our land-shells and one of the commonest, at least all

round the coast. Dr. Westerlund, in his large work, mentions that this species occurs in the British Islands only in the south of England, but it is really common as far north as Scotland.

FOREIGN DISTRIBUTION.—Great Britain, Belgium, France, Portugal, Corsica, Sardinia, Italy, Sicily, Malta, Cyprus, Algiers, Azores, Canaries, Morocco, St. Helena, occurs also in southern North America, Hayti and Chili, but is supposed to have been introduced.

GENUS—**BULIMINUS.**

Buliminus obscurus, Müller.

— — III. IV. V. — — — — — XII.

This species has only been found in the eastern counties of Ireland. It is not uncommon in the neighbourhood of Dublin.

FOREIGN DISTRIBUTION.—Great Britain, throughout continental Europe and Sicily.

GENUS—**COCHLICOPA.**

Cochlicopa lubrica, Müller.

I. II. III. IV. V. — VII. VIII. IX. X. XI. XII.

Thompson placed this species under the genus *Bulimus*, from which, however, it differs considerably. It is very common, especially in damp places under stones.

FOREIGN DISTRIBUTION.—It has an enormous distribution, ranging over Great Britain, throughout continental Europe, Sicily, Corsica, Azores, Madeira, Armenia, Tibet, Algiers, Morocco, Siberia, and throughout North America.

GENUS—**CÆCILIANELLA.**

Cæcilianella acicula, Müller.

— II. III. — V. VI. VII. — — — — —

Thompson, Jeffreys, and other authors, have placed this species under the genus *Achatina*, a name which is now exclusively used for a number of extra-European forms. *C. acicula* probably lives altogether underground, and it has very rarely been obtained living.

FOREIGN DISTRIBUTION.—Great Britain, Sweden, Germany, France, Italy, Portugal, Corsica, Madeira, Canaries, Switzerland, Austria, Hungary, Caucasus, Greece, Palestine, and Florida.

(TO BE CONTINUED).

NOTICE.

A series of papers on "The Earthworms of Ireland," will be commenced in the January number of the *Irish Naturalist*, by REV. HILDERIC FRIEND, F.L.S., of Idle, Bradford, Yorkshire.

MR. FRIEND will be grateful for worms from all parts of the country. They should be sent alive in damp earth or moss, in metal boxes. Packages should be marked "Natural History Specimens."

IN CAMP ON LOUGH ERNE.

BY R. LLOYD PRAEGER, B.A., M.R.I.A.

At the end of June last, in company with my friend and co-secretary of the Belfast Naturalists' Field Club, Mr. Francis Joseph Bigger, I spent three delightful summer days among the islands of lower Lough Erne. A good friend in Enniskillen, who is well known to Irish scientists as the discoverer of rarities in more than one department of science, obligingly procured for us a tent, a boat, and a captain and crew: our captain, a very important part of the equipment, was Patrick Murphy, an able and experienced boatman, whom I can safely recommend to any friends who may wish to explore the beauties of this fine lake; quiet and obliging, and cautious also, as one needs to be on these large sheets of inland water, which are often set with dangerous sunken reefs, and liable to squalls that have before now proved fatal to some of our best Irish botanists. Our crew consisted of Dick, a bright lad, whose idea of bliss was to roam the wooded islands with us in search of butterflies and ducks' nests, and throw stones at the gulls and rabbits. Our tent was pitched on the eastern side of Great Paris Island, under a group of tall Scotch firs, with a spreading oak on either hand, under which the bracken rose full six feet high, though not yet fully expanded. In front, a low belt of young birches, and then the lake, stretching away to the wooded shores of the mainland. At four o'clock every morning the sun, rising over the fir-woods of Gublusk Point, came bursting out over the water, and poured in a flood of light right into our tent. Then we would be up and astir, have a swim in the lake and a hurried cup of coffee, and away in our boat among the islands in the cool morning air, to return at nine or ten for breakfast. Then off again, not to be back till long after sundown, when a hearty meal, to which we did ample justice, was followed by an examination of the day's spoil, and a quiet smoke over the glowing embers, as we perched on the water-carved and moss-grown blocks of Calp sandstone and Old Red conglomerate which bestrewed the shore, watching the shadows darkening, and the ducks flapping about on the still water, brought the day to a close.

The greater part of our time during our short stay was spent in landing on island after island, rambling through the luxuriant woods with which most of them are clothed, or beating the dense scrub and long grass which cover others. Both of us were interested in the many birds which breed about the lake, and while my friend's attention was also directed to lepidoptera, I made some notes on the flora of the district. The avifauna of Lough Erne is decidedly rich, and

would well repay systematic investigation. We found two colonies of Terns breeding (species not determined), and on Gay Island a colony of Lesser Black-backed Gulls (*Larus fuscus*), and on Gull Rock a large colony of Black-headed Gulls (*L. ridibundus*). The nests of four species of duck were obtained. Of the Wild Duck (*Anas boschas*) two nests were found, with clutches of nine and seven eggs respectively; the eggs of the latter clutch, which I took, were still tolerably fresh, and, of a dark blue-green tint. Mr. R. J. Ussher, to whom I submitted an egg, writes that it belongs to a rare and beautiful variety, indistinguishable in size and colour from a set of Barrow's Golden-eye from Iceland in his collection. Of the Tufted Duck (*Fuligula cristata*), we obtained five or six nests, with clutches of from eight to thirteen eggs; the eggs of the only clutch which I brought home were very hard set. Four nests of the Red-breasted Merganser (*M. serrator*) were seen, with clutches of eight to ten eggs: they were also hard set. The nests in all the preceding instances were built on the ground among the rank grass and reeds, studded with bushes, that fringe the shores of the islands, the only exception being one of the Mergansers, which was placed in a recess at the foot of a tree in a thickly-wooded islet. Of the Common Sheldrake (*Tadorna cornuta*) one nest was found on Bess Island, in a very peculiar position, being built among long grass in tolerably level ground on the summit of the low ridge that forms the backbone of the little islet. The nest was very slight, a mere hollow lined with a little grass, and it contained two fresh eggs: Mr. Ussher has kindly confirmed the species. The only other nest of note that we got was that of a Woodcock, among bracken on one of the wooded islands, containing four eggs that would have been hatched in about a week. Though the Woodcock is generally a very early breeder, late nesting does not appear unusual with it; on July 25th, 1882, I found a nest with four eggs not more than half incubated, on Slieve Donard, Co. Down: and I have heard of another nest, asserted to have been that of a Woodcock, obtained on the Mourne mountains in the month of June.

In reply to queries of my friend Mr. Ussher, I would say that we found no trace of either the Great Black-backed Gull (*L. marinus*), or the Common Gull (*L. canus*), breeding on lower Lough Erne; and our boatman stated that the two species (*L. fuscus* and *L. ridibundus*) which we found, and which he called respectively "Horse Gull" and "Common Gull" were the only ones he had ever observed breeding in the district.

It is, however, to the flora of Lough Erne that I wish at present to refer. The botany of the lake-shores has been examined somewhat exhaustively by Mr. R. M. Barrington, the fruits of his careful investigations appearing in the *Proceedings of the Royal Irish Academy*, 2nd ser., vol. IV., (1884).

Mr. Barrington spent three weeks in exploring the upper and lower lakes, and the results of his enquiry place the flora of Lough Erne at about 405 species (omitting the doubtful plants in his list, which are somewhat numerous), showing that the district is fairly productive of plants.

One thing that struck me on our rambles was the large colonies of certain species that occur on different islands, many of the islands having a characteristic plant which is more or less rare elsewhere. Thus, Heron Isle was in possession of *Rhamnus catharticus*; Dacharne Island yielded a profuse and luxuriant growth of *Solidago virgaurea*; Inishdavar, *Arenaria trinervia*; Namanfin, *Vicia sylvatica*; Strongbow, *Agrimonia eupatoria*; Cleenishmeen, *Eupatorium cannabinum*. This would appear to show that the species in question arrived at the islands subsequent to their isolation under present conditions, and that the plants have spread as far as the natural boundary of water would permit.

The vegetation on the wooded islands is remarkably luxuriant, and we were frequently struck with the beauty and verdure that surrounded us. As instances of luxuriant growth I may mention that *Campanula rotundifolia* was gathered on the rocks of Heron Isle 2 feet 8 inches in length, though yet immature; *Solidago* grew abundantly 3 to 4 feet high; and the size of the three species of *Lastrea* was remarkable. *Polygala* becomes one of the showiest flowers on the lake-shore; one plant bore upwards of 100 upright stems, a foot in length, and crowned with very large deep-blue flowers; and magnificent snow-white tussacks of *Galium boreale* were abundant. The arboreal vegetation of Lough Erne is largely indigenous, and is interesting on that account. Bilberry Island (*alias* Goat Island) yielded a characteristic group of native trees and shrubs, which was as follows, and which embraces nearly all the indigenous species: *Quercus*, *Fraxinus*, *Alnus*, *Betula alba*, *Populus tremula*, *Corylus*, *Cratægus*, *Ilex*, *Euonymus*, *Rhamnus catharticus*, *Prunus aucuparia* and *malus*, *Viburnum opulus*, *Salix cinerea* and *aurita*, *Prunus spinosa*, *Myrica gale*, *Rosa spinosissima*, *canina*, and *tomentosa*. I see no reason whatever to doubt *Populus* being indigenous. Mr. Barrington marks it as "certainly not native."

Of the four hundred odd species recorded by Mr. Barrington, I noted just two-thirds on the islands visited by us; some additional species were found, for which it may be worth giving localities; as will be noticed, most of the plants were collected on the islands in the central portion of the lake, but a morning row up the navigable portion of the pretty stream at Ballycassidy, on the eastern shore, also resulted in some additions to the flora.

ADDITIONAL SPECIES.

- Ranunculus ficaria**.—On Lamb Island.
Montia fontana.—On Inishmacsaint and elsewhere.
Hypericum perforatum.—East shore of Inishfree.
Geranium molle.—Shore of Inistoney, which is one of the few of the lower islands that are cultivated.
Vicia hirsuta.—On the shores of Inishfree and Long Island.
V. angustifolia.—Stony shore on Inishmacsaint.
Sarothamnus scoparius.—Hedges on Inistoney; it appears quite absent from the natural wood and scrub of the islands, and *Ulex* is nearly equally rare.
Pyrus malus.—Observed in a number of stations, such as Inishfree, apparently quite native.
Circeea alpina.—Abundant on a number of the islands—Great Paris, Inishmacsaint, Dacharne Island, Owl Island, Gublusk Island, etc. I have no doubt that it was included by Mr. Barrington under *C. lutetiana*.
Æthusa cynapium.—Cultivated field by the Ballycassidy River.
***Mimulus luteus**.—On the lake shore at Dacharne Island, and near the mouth of Ballycassidy River.
Mentha sativa.—Abundant on the stony margins of the islands. This is certainly the plant quoted under "*M. arvensis*?" by Mr. Barrington as common on the shores of the islands. *M. arvensis* is not usually found in such a situation.
M. arvensis.—Cultivated field by Ballycassidy River.
Salix purpurea.—Banks of Ballycassidy River.
Potamogeton crispus.—Sparingly in Ballycassidy River.
Carex pilulifera.—Rabbit Island.
C. distans.—On Cleenishgarve.
Agrostis vulgaris, var. *pumila*, Lightfoot.—Shores of Hay Island.
Holcus mollis.—Sparingly on Inishfree.
Triodia decumbens.—Noted from Inishdavar only, but seen elsewhere.
Brachypodium sylvaticum.—On Rabbit Island.
Polypodium vulgare, var.—A form with very long narrow sharply serrate lobes, the stipe longer than the rachis, and the leafy portion of the frond about half as broad as long, occurred on rocks on Cleenishmeen. In Co. Antrim this form occurs with, and merges imperceptibly into true deeply-pinnatifid var. *semilacerum*, which latter often returns to this form when under cultivation.
Asplenium adiantum-nigrum.—Inishmacsaint; certainly rare in the district, but Mr. W. H. Phillips tells me of a wall by the Ballyshannon road near Poulaphuca, covered with this species, *A. trichomanes*, *A. ruta-muraria*, and *Ceterach*, the last-named of which is also an addition to the flora of the district.
Selaginella spinulosa.—Among short turf on Rabbit Island.

Of the plants above named, *Carex distans* is an addition to the flora of district x. of "Cybele Hibernica."

The following additional notes refer to species quoted as rare by Mr. Barrington, and for which only one station is given in his list.

- Ranunculus penicillatus**.—In the Ballycassidy River.
R. bulbosus.—Rabbit Island. Decidedly rare in the district.
Lychnis diurna.—On rocks on the shore of Cleenishmeen.
Trifolium medium.—Owl Island, Inishfree, and abundant on Bess Island.
Vicia sylvatica.—Seen by Mr. Barrington on Namanfin only. I found it abundantly there and on Bess Island, and in another station which I did not note.

- Alchemilla arvensis.**—Pastures on Hay Island.
Myriophyllum alterniflorum.—Still water inside of Cleenishgarve.
Callitriche hamulata.—Pools on Hay Island.
***Matricaria parthenium.**—Stony shores of Inistoney, apparently quite naturalised; there is a house on the island.
Hieracium umbellatum?—A large colony of an accipitrinous Hawk-weed, not yet in flower, was found on low and stony ground at the western extremity of Gay Island, where the Lesser Black-backed Gulls breed. Both as regards growth and habitat it resembles the colony of *H. umbellatum* described by Mr. Barrington as occurring on Isle Namanfin (where, however, I did not notice it), and it is presumably the same species. I brought home roots to grow.
Solanum dulcamara.—Little Paris Island, beside a deserted cottage; Rabbit Island. Introduced in the first station.
Scutellaria galericulata.—East side of Great Paris Island, abundant; shore of Gublusk Point, and Cleenishmeen.
Salix viminalis.—Banks of Ballycassidy River.
S. repens.—Shore of Gublusk Point.
Typha latifolia.—Ballycassidy River, sparingly.
Festuca sciuroides.—Hay Island, sparingly.
Lastrea æmula.—Luxuriant in woods on Great Paris Island and Inishfree.
Osmunda regalis.—Sparingly on Sally Island, Lamb Island, and Bilberry Island.

Of *Rhamnus catharticus*, which is a characteristic plant of the Lough Erne islands, a very coarse form was gathered on Strongbow Island, with thicker branches devoid of spines, and broadly ovate leaves measuring 2 to 3 inches in length, by 2 to 2½ in breadth; the shrub differed much in appearance from normal *Rhamnus*, which was growing near, but intermediate forms occurred.

SOME OF THE BIRDS OF LAMBAY ISLAND.

BY J. E. PALMER.

It has been suggested that a few observations resulting from an excursion to Lambay Island in June, 1891, may interest some of the readers of this Journal. As we observed nothing that would be of special interest to ornithologists acquainted with the island, and as its ornithology is well known, my remarks will refer chiefly to the habits of the birds. While some of the party returned home after a few hours, two of us arranged to be accommodated at houses on the island, and remained there for two nights.

For those not knowing the locality, I may say that Lambay Island is three or four miles from the mainland; has a circumference of several miles, and rises to a height of a few hundred feet. The south-western end is under grass, and slopes to the shore, but the greater part is wild, uncultivated moorland, where bracken, bramble, heather, and furze figure largely in the landscape. A general idea of the upland character of the island may also be gathered from a knowledge of

its land birds: the Stonechat, Wheatear, Meadow Pipit, Linnet, and Kestrel all make it their home; and the Peregrine Falcon, too, sometimes nests there.

The greater part of the coast-line is rocky and precipitous, and its crags and ledges are mostly inaccessible to ordinary climbers. It is the rock-breeding sea birds—the Kittiwake, Guillemot, Razorbill, the two Cormorants, and some other species, such as the Puffin and Manx Shearwater, that make the island interesting to ornithologists.

The Puffins are much the most numerous of the birds found there. Their curious appearance, when one first comes up to rows or groups of them, invariably attracts attention. They stand almost upright; their black-coated backs, large white fronts, and their solemn, silent, vigilant demeanour seem to combine in giving them a quaint, odd-looking, unbirdlike aspect. Some of them stand for hours at a time on the grassy herbage-covered slopes, which stretch upwards above the cliffs. Probably they station themselves near the mouths of the burrows where they nested. The slopes above the cliffs, on the eastern side of the island, are full of rabbit burrows; but the Puffins are in possession, and the rabbits have gone to other parts of the island. These curious birds watch you in their odd way, without seeming afraid, till you get within a very few yards of them, when, one after another, they quickly fly off in a downward direction, sometimes to circle about in mid air, and sometimes to alight on the water below.

While hundreds, if not thousands, of Puffins were to be seen standing in small companies on the sides of the hills, many others were resting on the water, and immense numbers were, at the same time, to be seen flying round and round on all sides. The incessant and rapid beating of the wings gives a quick direct flight that reminds one of that of the Red Grouse. Businesslike as it looks, however, there seems to be no purpose in it beyond the pleasure of exercise. After a good deal of it has been gone through, the birds settle down among their fellows, and stand solemnly looking out to sea for hours.

The young Puffins are easily distinguished from the adults, in June, not being quite fully grown, and being less proficient on the wing. I watched numbers of them flying round and round over nearly the same track, for a length of time. As they circled past, one could see the use they made of their bright orange webbed feet, one stretched out at each side of the tail, to assist the latter organ in steering their course. They appeared not always able to stop and alight where they seemed to intend to, like the old birds. Some came circling round towards resting places, where groups of others were standing, and lowered their feet to alight, without being able to do so, owing, apparently, to the speed at which they were going.

The noise at one of these bird colonies is virtually ceaseless

all day long. It is kept up by many of the birds—at the time of year referred to, when there are immense numbers of young ones—quite irrespective of the presence of human visitors. It was going on just the same when I approached the cliffs the morning after arriving on the island, when there was a thick mist which must have prevented my being seen. It was a calm, quiet morning, and I heard the cries of the birds when a quarter of a mile from the largest colony, and before I saw a single bird.

The Kittiwakes and Herring Gulls were perhaps the noisiest. With the exception of the Kittiwakes on their nests, the birds on the wing seemed to make most noise. Those on the rocks and on the grass generally remain silent, unless there is some particular cause for alarm. Every now and then scores of Kittiwakes, seemingly all in the vicinity, set up loud cries, sometimes when a Lesser Black-backed Gull, or other enemy, or supposed enemy, came too near their nests, and then after a time they relapsed into silence.

After having spent the morning on the water, fishing, a number of Cormorants congregated on one rock—a large prominent one, from which a good look-out could be kept—and rested as solemnly and silently as the Puffins, until towards evening, when they scattered themselves over the water again.

Though not as numerous as the Puffins, the Kittiwakes are the most plentiful of the gulls on the island. They are the latest with their nesting operations of any of the gulls, not arriving at the island until near the end of May. They were all busily “sitting” at the time of our visit; and it was an interesting sight to see their partners feeding the birds on the nests. The latter seemed to feel the wearisomeness of continued “sitting,” for now and then, first one and then another would stand up on the edge of the nest and stretch its wings, or shake itself, and then settle down again.

The Kittiwakes, with few exceptions, nest in compact little colonies by themselves, often so close together that neighbouring nests and birds touch each other. The nests are placed on slight ledges, or on very small projections on the face of rough perpendicular cliffs, where it would be impossible to obtain a foothold.

With the exception of Puffins and Herring Gulls, whose nesting places are rather more widely scattered, the different kinds of sea birds, although nesting in considerable numbers, in tolerably close proximity to each other, at the several breeding places around the island, mostly form compact little nesting colonies composed of their own species only. The Guillemots and Razorbills nest on ledges, particularly about large fissures or openings in the cliffs; Herring Gulls on grassy slopes and ledges, or among broken rocks, nearly always in places where you can easily walk up to the nests;

Kittiwakes choose spots such as might be thought to afford no site at all for a nest; and the Puffins, unlike their neighbours in this, as in other respects, nest in old rabbit burrows.

A company of Herring Gulls were sadly disturbed one night. I had gone to the headland at the north-east of the island, in order to watch, if possible, the Manx Shearwaters, which I understand nest there. Between nine and ten o'clock I heard the hoarse cackling cries of Herring Gulls above me, and saw two or three dozen of them sailing about overhead. There were several of their disused nests in the grassy hollows. They were evidently wanting to settle down for the night at their roosting place, and so I was particularly unwelcome just then. They continued their cries, and remained on the wing more than an hour, and then, as the darkness slowly became more visible, and everything else less and less distinct, they gradually became quieter, and settled down at a little distance. But evidently they were watchful and on the alert, for as long as I remained—up to about one o'clock—their alarm notes were occasionally to be heard.

The part of the night I spent at the haunt of the Shearwaters was not light enough to allow of the birds being seen, except occasionally, when one happened to fly quite near me; and then all that could be discerned was a dark object, which was indistinguishable from a swift or a bat, and gone in a moment. No trace of the birds was to be found while any glimmer of light lasted; nor did I discover any of their nesting places. But they began to make themselves heard when signs of day had disappeared. Apparently from close to the water down below me, there came the quickly repeated curious cry of four syllables, which told of the birds of which I was in search. This was about twenty minutes to eleven. More similar notes soon followed, and for some time the number of birds coming out of their holes, judging from the notes heard, was constantly increasing. By midnight it sounded as though there might be three or four dozen birds all uttering their notes together. For some time, at first, they kept down near the water, or at any rate their notes only came from there; but after a while they took to flying higher, and some of them passed in all directions over the island. The greater number kept about the rocky headland, but as I made my way back to the other end of the island, their cries, though fewer and fewer the further one got from their haunt, were to be heard all the way.

Of all the odd notes of birds the curious cry of the Manx Shearwater is far from being the least peculiar. It is unlike that of any other bird I know. At night, when a number are heard together, it is almost of the kind to bring up, in some minds, ideas of things weird or uncanny; and it seems to suggest a possible explanation for the belief in supernatural beings, which existed in former generations.

PERFORATIONS IN CARBONIFEROUS LIMESTONE.

BY R. F. SCHARFF, PH.D., B.SC.

I HAVE been asked by Mr. Carpenter to make a few observations on the very remarkable perforations which Mr. Owen Smith discovered in the Carboniferous Limestone near Nobber, Co. Meath. They were first described by him in the June number of the IRISH NATURALIST, and the following month notes appeared by Messrs. Fallon, McBride, and Walpole, who had all seen similar perforated rocks in different parts of the country. The Rev. Mr. Close has also observed them by the side of Lough Mask, and he remarks that we have to choose between the only two alternatives:—that these perforations have been produced by weathering or by the action of a boring mollusc. Mr. Smith is in favour of the latter view, but most of the writers of the above-mentioned notes are rather in favour of their having been caused by the action of water on the limestone.

But when we consider the position of the holes, their varying depth while the diameter remains constant, their upward tendency, their being confined to a portion of the stone only, and, as Mr. Smith justly remarks, their great “family likeness,” the aqueous theory presents formidable difficulties. Indeed it seems to me impossible to conceive how either chemical or mechanical action of water could produce these perfectly smooth perforations of an inch in diameter on the face of a limestone rock, and having seen the specimen which was forwarded to the Editors of the IRISH NATURALIST, I have not a doubt that the explanation given by Mr. Smith is the correct one.

A marine boring mollusc (*Pholas crispata*), still inhabiting the Irish Sea, fits exactly into some of the holes, and the first impulse to attribute the perforations to the action of this or an allied species appears quite justified. The geological deductions, moreover, which we can draw from such a conclusion are so seductive that it is difficult to abandon a theory of such important bearings. *Pholas*-borings *in situ* at Nobber, in such a fresh condition, mean that within very recent times that locality must have been covered by the sea, perhaps to a depth of 200 feet, for the species of *Pholas* are known to live at a depth below the surface of the sea not exceeding 30 fathoms. We know that marine shells are found at an altitude of about 1000 feet in the Dublin Mountains, and the presence of a number of other deposits in various parts of Ireland renders it extremely probable that within a recent geological period the sea covered a large portion of eastern Ireland at any rate. In spite of a number of facts which may be adduced as evidence in support of the

theory that the Co. Meath, and with it the site of the village of Nobber, were submerged beneath the sea at a comparatively recent period, I venture to think that, nevertheless, the perforations in question are not due to the action of *Pholas*, or any other marine mollusc, and in this view I am supported by Prof. Sollas.

It may not be out of place to refer here to a discussion which was continued for several years between 1869 and 1872, in the *Geological Magazine*. Lithodomous perforations, exactly similar to those described above from various parts of Ireland, were discovered in the Carboniferous Limestone of the Great Orme's Head in Wales by Mr. R. D. Darbishire. He considered them to have been formed by a species of *Pholas*, probably *P. crispata*. Prof. Bonney, in reply to several articles on the same subject, figures a number of sections of the supposed pholas burrows which show clearly that they could not have been produced by that or any other marine mollusc. Moreover, in a great many of the holes he found living specimens of *Helix aspersa*, and he comes to the irresistible conclusion that the perforations "are not the weathered burrows of departed *Pholades*, but have been, and are being hollowed out by *Helices*, the principal, if not the only agent being *Helix aspersa*."

But not alone in England have these perforations in the Limestone been observed and recorded. In a paper entitled "Observations sur les Hélices Saxicaves du Boulonnais" M. Bouchard-Chantreaux describes similar excavations at great length. He watched them for many years with great care, and measured their progress from time to time, which left in his mind no doubt of the fact that they were made by snails. He found that if he removed the snail, whilst in the act of perforating the limestone, the exudation from the mouth reddened litmus paper, showing the secretion was then of an acid nature. It is probable, therefore, that the perforating action is mainly a chemical one, though the mechanical action of the snail's tongue, which is like a little rasp, must assist it in the work to some extent.

Helix aspersa is a very common snail in most parts of Ireland, and I believe, considering the evidence we have before us, that the burrows in the Carboniferous Limestone discovered by Mr. Smith in the Co. Meath are not only due to the action of that mollusc, but are being produced by it at the present day.

The perforation in the stone from the harbour-bed at Westport, sent by Mr. McBride, is undoubtedly due to the action of a species of *Pholas*.

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A. F.E.S.

(Continued from page 99.)

CRYPTOPHAGIDÆ.

- Telmatophilus caricis**, Ol.—Lowry's Lough, sweeping *Carex*, etc.—pretty common.
- T. schonherri**, Gyll.—Mullinure, by sweeping—rare.
- Cryptophagus setulosus**, Sturm.—Mullinure, by sweeping—pretty common.
- C. saginatus**, Sturm.—Mullinure—rare.
- C. umbratus**, Er.—Mullinure, in moss and by sweeping—not common.
- C. scanicus**, L. }
var. **patruelis**, Sturm. } Common throughout district.
- C. affinis**, Sturm.—Mullinure, in flood-rubbish—rare.
- Micrambe vini**, Panz.—Folly, Drummanbeg Lake, in moss—common.
- Atomaria diluta**, Er.—Lowry's Lough, in moss—not common.
- A. fumata**, Er.—Lowry's Lough, in moss—rare.
- A. barani**, Bris.—Common throughout district, in moss.
- A. fuscipes**, Gyll.—Palace Demesne, in moss—rare.
- A. nigripennis**, Payk.—Mullinure, in moss—rare.
- A. fuscata**, Sch.—Dean's Hill, Folly, Mullinure, in moss and by sweeping—pretty common.
- A. atra**, Herbst.—Lowry's Lough, Mullinure, in moss—rare.
- A. pusilla**, Payk.—Mullinure, Little Castledillon, in moss, flood-rubbish, and by sweeping—rare.
- A. basalis**, Er.—Common throughout district, in moss, etc.
- A. mesomelas**, Herbst.—Lowry's Lough, in moss—rare.
- A. gutta**, Steph.—Lowry's Lough, in moss—pretty common.
- Ephistemus globosus**, Waltl.—Mullinure, in moss—rare.
- E. gyρινoides**, Marsh.—Mullinure, Lowry's Lough, in moss and by sweeping—pretty common.

MYCETOPHAGIDÆ.

- Typhæa fumata**, L.—Mullinure, sweeping—rare.

DERMESTIDÆ.

- Attagenus pellio**, L.—A single specimen on my study table.

BYRRHIDÆ.

- Cytilus varius**, F. }
Simplocaria semistriata, F. } Common throughout district, in moss, and flood-rubbish.

PARNIDÆ.

- Limnius tuberculatus**, Müll.—Common throughout district, in streams.
- Parnus prolifericornis**, F.—Common throughout district, at edges of ponds, etc.

LAMELLICORNIA.

- Dorcus parallelipedus**, L.—One specimen brought to me many years ago by one of my pupils.
- Aphodius fossor**, L. }
A. fimetarius, L. } Common throughout district, in *stercore bovino*.
A. ater, De G. }

Aphodius rufescens, F.—Dean's Hill—rare. It occurs very freely on the coast.

A. merdarius, F.—Dean's Hill, Beech Hill—not common.

A. prodromus, Brahm.

A. contaminatus, Herbst. } Common throughout district.

A. obliteratus, Panz.—Lowry's Lough—rare.

A. rufipes, L.

A. depressus, Kug. } Common throughout district.

Geotrupes stercorarius, L.—Common throughout district.

Serica brunnea, L.—Dean's Hill—rare.

Melolontha vulgaris, F.—Occurs at intervals, but not in numbers.

SERRICORNIA.

Cryptohypnus riparius, F.

Athous hæmorrhoidalis, F. } Common throughout district, by sweeping.

Adrastus limbatus, F.

Agriotes obscurus, L.

Dolopius marginatus, L.—Loughgall, in Manor Demesne—rare.

Corymbites cupreus, F.

C. quercus, Gyll.

var. **ochropterus**, Steph. } Common throughout district, by sweeping meadows.

Helodes minuta, L.

H. marginata, F.

Microcara livida, F., var. **bohemanii**, Mannh.—Mullinure—by sweeping—not common.

Cyphon variabilis, Thunb.—Common throughout district, by sweeping.

Scirtes hemisphaericus, L. } Pond near railway in Drummanmore; both by sweeping *Persicaria*, etc., the latter is much less plentiful than the former.

S. orbicularis, Panz.

Telephorus bicolor, F.

T. hæmorrhoidalis, F. } Common throughout district, by sweeping.

T. flavilabris, Fall.

T. thoracicus, Ol.—Loughgall, by sweeping—rare.

Rhagonycha fulva, Scop. } Common throughout district, by sweeping.

R. limbata, Thoms.

R. pallida, F.—Drummanbeg Lake, Mullinure, by sweeping—not common.

Malthinus punctatus, Fourc.—Mullinure, by sweeping—not common.

Malthodes marginatus, Latr.—Dean's Hill, Mullinure, by sweeping—not common.

Ptinus fur, L.—Cathedral Grammar Schoolroom—rare.

Niptus hololeucus, Fald.—In houses—common.

N. crenatus, F.—One specimen in an old house.

Priobium castaneum, F.—Mullinure, Palace Demesne, sweeping—rare.

Anobium domesticum, Fourc.—In picture frames, etc.—common.

Cis boleti, Scop.

C. bidentatus, Ol. } Palace Demesne, Lowry's Lough, in *Boleti*—common.

Octotemnus glabriculus, Gyll.—Mullinure. Palace Demesne—in moss and *Boleti*—common.

LONGICORNIA.

Pogonochærus bidentatus, Thoms.—A single specimen taken by Mrs. Johnson in the Loughgall Manor grounds.

PHYTOPHAGA.

Bruchus atomarius, L.—Mullinure, sweeping—common.

Donacia dentata, Hoppe.—Drumbee, Mullinure, sweeping, and on water plants—rare.

D. dentipes, F.—Drummanbeg Lake, in moss—rare.

- Donacia limbata*, Panz. (*lemnæ*, F.) } Common throughout district,
D. simplex, F., *Syst. Ent. (linearis*, Hoppe.) } on water plants, etc.
D. vulgaris, Zsch. (*typhæ*, Ahr.) }
D. semicuprea, Panz. (*simplex*, F.)—Mullinure—rare.
D. sericea, L.—Loughnashade—rare.
Lema lichenis, Voet.—Common throughout district, by sweeping.
Chrysomela staphylea, L. } Common throughout district.
C. polita, L. }
C. hyperici, Forst.—Quarry near Grange, on *Hypericum perforatum*—rare.
Gastroidea viridula, De G. (*raphani*, Herbst.) Common throughout district, on *Rumex*.
Phædon tumidulus, Germ. } Common throughout district, by sweeping
P. armoraciæ, L. } and in moss.
Phyllodecta vitellinæ, L.—Mullinure, Lowry's Lough—common on willows.
Hydrothassa marginella, L. } Common throughout district, sweeping water
Prasocuris junci, Brahm. (*beccabungæ*, Ill.) } plants, and in moss.
P. phellandrii, L. }
Lochnæa cratægi, Forst.—Dean's Hill—rare.
Galerucella nymphææ, L.—Lowry's Lough, Mullinure, sweeping—common.
G. lineola, F.—Lowry's Lough, on tallows—plentiful.
G. calabriensis, L.—Mullinure, sweeping—rare.
G. tenella, L.—Loughgall, Lowry's Lough, Mullinure, sweeping—common.
Adimonia tanaceti, L.—A single specimen on the footpath near the railway station.
Longitarsus pulex, Schrank.—Common throughout district.
L. ater, F. (*parvulus*, Payk.)—Mullinure, in moss—rare.
L. holsaticus, L.—Loughnashade, in moss—rare.
L. luridus, Scop.—Common throughout district, sweeping, and in moss.
L. brunneus, Duft.—Lowry's Lough, in moss—rare.
L. atricillus, L.—Common throughout district, sweeping, and in moss.
L. patruelis, All.—Lowry's Lough, in moss—rare.
L. melanocephalus, All.—Mullinure, Lowry's Lough, sweeping—rare.
L. piciceps, Step.—Lowry's Lough, in moss—rare.
L. exoletus, L.—Mullinure, by sweeping and in moss—not common.
L. pusillus, Gryll.—Mullinure, in moss and flood rubbish—plentiful.
L. jacobææ, Wat.—Common throughout district, by sweeping.
L. gracilis, Kuts.—Mullinure, in moss—rare.
Phyllotreta undulata, Kuts.—Common throughout district, by sweeping.
P. nemorum, L.—Mullinure, in moss and sweeping—not common.
P. exclamationis, Thurb.—Common throughout district, in moss, etc.
Aphthona nonstriata, Goeze.—Palace Demesne, on *Iris pseudacorus*—plentiful.
A. atratula, All.—Loughnashade, in moss, one specimen.
Sphæroderma testaceum, F.—Common throughout district, sweeping.
Apteropoda orbiculata, Marsh.—Common throughout district, sweeping and in moss.
Mantura chrysanthemi, Koch.—Vicar's cairn, in moss, one specimen.
I have taken several in moss from Dead Man's Hill, near Newtown-Hamilton.
Crepidodera transversa, Marsh. } Common throughout district, by
C. ferruginea, Scop. } sweeping.
C. rufipes, L.—A single specimen in Mullinure, by sweeping.
C. ventralis, Ill.—Mullinure, Drummanbeg Lake, sweeping—rare.
C. helixines, L.—Lowry's Lough, beating tallows, one specimen.
C. aurata, Marsh.—Mullinure, Lowry's Lough, beating tallows, not common.
Flectroscelis concinna, Marsh.—Common throughout district, sweeping and in moss.

- Psylliodes chrysocephala**, L.—Mullinure, sweeping—rare.
P. napi, Koch.—Common throughout district, by sweeping and in moss.
P. cuprea, Koch.—Palace Demesne, in moss, one specimen.
P. chalcomera, Ill.—Mullinure, Drummanbeg Lake, sweeping—not common.
P. picina, Marsh.—Mullinure, by sweeping and in flood rubbish—pretty common.
Cassida flaveola, Thunb.—Mullinure, in moss—rare.
C. equestris, F. } Mullinure, Lowry's Lough, in moss and by sweeping,
C. viridis, F. } especially on *Mentha*—pretty common.

(TO BE CONTINUED.)

NOTES.

BOTANY.

FUNGI.

FUNGI FROM LUCAN AND BRAY DISTRICTS. During a short residence at Ballyowen House, near Lucan, Co. Dublin, in the beginning of June, I met with the following species: *Agaricus (Pholiota) capistratus*, Cooke, on old stumps, Ballyowen; *A. (Ph.) mutabilis*; *Panus torulosus*; *Polyporus squamosus*, Fr.; *P. obducens*, Fr.; and *P. sulfureus*, Fr.; *Dadalea unicolor*, Fr.; *Stemonitis fusca*, Roth; and *S. ferruginea*, Ehrb., on stumps, Ballyowen; the plasmodia of these species were white and delicate pink respectively and the specimens found were of very large size; *Reticularia umbrina*, Fr., same locality, the specimens were of great size, one on the cut surface of an old stump being six inches in diameter at the base of the peridium; *Didymium furfuraceum*, Fr., same locality; *Peziza (Lachnea)* near *bulbocrinita*, Phil., on dead umbelliferous stems, Ballyowen-lane (I am not sure of this species as it differs from Phillips' in the colour of the hairs which are tawny yellow); *Peronospora effusa*, Grev. on spinach in garden; *P. schleideniana*, De By., on *Allium ursinum*, Lucan demesne; *P. nivea*, Ung. on *Ægopodium podagraria*, Lucan demesne; *P. lamii*, De By., on *L. purpureum* in Ballyowen-lane; *Uromyces dactylidis*, Otth., æcidiospores on *Ranunculus bulbosus*, field in front of Ballyowen House; *Puccinia galii*, Pers., æcidiospores on *G. verum* in Esker old churchyard; *Uromyces geranii*, D. C., uredo- and teleuto-spores on *G. molle* in Esker old churchyard, æcidiospores not found; *Puccinia caricis*, Schum., æcidiospores on *Urtica dioica*, abundant in Ballyowen-lane; *P. pimpinelle*, Strauss, teleuto-spores, abundant in Lucan demesne; *P. poarum*, Nielsen, æcidiospores and spermogonia on *Tussilago farfara*, abundant; *P. glomerata*, Grev., on leaves and petioles of *Senecio jacobæa*, Lucan demesne, north side of river.

I have collected and identified the following species, in the vicinity of Bray, during the last month: *Agaricus (Amanita) vaginatus*, Bull, in Bray Head firwood; *A. (Amanita) rubescens*, Pen., the commonest agaric in the firwood, Bray Head; *A. (Hebeloma) geophyllum*, Sow., same place; *Coprinus radiatus*, Fr., same place, abundant; *Cortinarius (Dermocybe) uliginosus*, Berk., *Gomphidius viscidus*, Fr., firwood in Glencree; *Russula integra*, Fr. Bray Head firwood; *Lactarius deliciosus*, Fr. Bray Head; *Boletus flavus*, With., same place, abundant; *B. granulatus*, Linn., same place; *B. laricinus*, Berk., roadside between Kilruddery and Boghall; *Polyporus armeniacus*? Berk.; *Apyrenium lignatile*, Fr.; *Phallus impudicus*, L., abundant; *Arcyria incarnata*, P.; *Ascobolus furfuraceus*, Pers.; *Peziza granulata*, Fr.; *Phacidium trifolii*, Bond.; *Peronospora trifoliorum*, De By., all Bray Head; *Puccinia variabilis*, Grev., æcidio- and teleuto-spores, on same leaf, Bray Head, south side: *P. taraxaci*, Plow., much commoner than

preceding species; *P. hieracii*, Schum., on various *Compositæ*, very common: in one case found mixed with small purplish sori consisting of purplish spores much more minute than those of any uredine, and distinctly reniform, the entire plant (*Carduus arvensis*) was covered with these sori, and with the uredospores and spermatogonia of *P. hieracii*; *P. centaureæ*, Mart.; *P. annularis*, on *Teucrium scorodonia*, scarce, Bray Head; *Phragmidium rubi*, Pers., Bray Head; *P. subcorticatum*, Schrank., near Delgany; *Ecidium periclymeni*, Schum., scarce; *Uromyces anthyllidis*, Grev.; *U. rumicis*, Schum.; *Coleosporium senecionis*; *C. sonchi*, Pers., common on various host-plants; *Melampsora lini*, Pers. abundant, all Bray Head; *M. helioscopia*, Pers., Ravenswell, abundant; *M. betulina*, Glencree, uredo only; *Urocystis anemones*, Pers., on *Ranunculus acris*, Bray Head swamp; *Protomyces macrosporus*, Unger, on *Egopodium podagraria*, Ravenswell.—E. J. M'Weeney, Dublin.

PHANEROGANS.

REDISCOVERY OF *Rubus chamaemorus* IN IRELAND.—*Rubus chamaemorus* has not been gathered in Ireland since 1826. Its claims to be considered a native plant are discussed in detail by Mr. A. G. More, in the July number of the *Journal of Botany* (vol. i. p. 105). It has been searched for in vain by many botanists during the past sixty-six years. Stimulated by Mr. More's letter, Mr. R. Lloyd Praeger again attempted to find this species and records his failure in the *Journal of Botany* for August. On the 10th of that month we made a careful examination of portion of the Sperrin range lying west from Dart, and returned in triumph, having discovered a small patch of *Rubus chamaemorus* in district X. of "Cybele Hibernica," and a still smaller patch in district XII.

Notwithstanding the difficulty which it is believed any botanist would find in detecting the exact locality, it is prudent not to disclose it further. The species occurs so sparingly, and has apparently such a keen struggle for life amid *Sphagnum*, heather, etc., that no effort should be spared to protect one of the rarest and most interesting Irish Alpine plants.—H. C. Hart, Carrablagh; Richard M. Barrington, Bray.

PLANTS OF LOUGH SHEELIN. In the spring of 1885 I spent a few days in the neighbourhood of Lough Sheelin, which lies on the borders of counties Cavan, Meath, and Westmeath, with Longford closely adjoining. Though my time was engaged otherwise than in botanizing, a few plants were collected, which may be worth recording, considering the incompleteness of our knowledge of the flora of some of the central counties. Lough Sheelin forms the junction of districts V., VII., and X. of "Cybele Hibernica"; I have added to each station the number of the district in which it is situated.

Ranunculus trichophyllus, Chaix., River Inny below Lough Kinale (VII.); *R. heterophyllus*, Fries, and *R. peltatus*, Fries, River Inny below Lough Kinale (VII.); *Arabis hirsuta*, R. Br., edge of platform at Cavan railway station (X.); *Draba verna*, L., ditch-bank by roadside at Rock of Carrick, north of Finnea (X.); *Viola odorata*, L., banks at Abbeylara (VII.), Ross Castle (V.), and Bracklagh (X.); *Geranium lucidum*, L., limestone cliffs at Rockland, half-way between Lough Sheelin and Castlepollard (VII.); *Saxifraga tridactylites*, L., on blocks of limestone below cliffs at Rockland, south of Lough Sheelin (VII.); *Carum carui*, L., in a railway ballast pit at the southern end of Lough Kinale (VII.); *Andromeda polifolia*, L., abundant on a bog on the southern margin of Lough Kinale (VII.); *Lamium album*, L., on both sides of the River Inny at Finnea (VII. and X.); *Primula veris*, L., many spots around Lough Sheelin (V., VII., and X.); *Lastrea æmula*, Brack., roadsides south of Scrabby, by the River Erne (VII. and X.); *Polystichum aculeatum*, Roth., plentiful on roadsides a mile west of Abbeylara (VII.); *Bovista nigrescens*, P., woods near Ross Castle (V.); *Lycoperdon saccatum*, Vahl., wood west of Ross Castle (V.)

Ranunculus peltatus and *Viola odorata* do not appear to have been previously recorded from district VII.—R. Lloyd Praeger.

THE SHAMROCK OF IRELAND. Mr. Colgan's paper in the August number of this Journal is of considerable and general interest. Would it not be possible to take a much more extended plebiscite than that which the author carried out, by means of the *Irish Naturalist*, which has readers in every part of this country? There should be no difficulty in getting authenticated specimens of shamrock from every county in Ireland—indeed, almost from every barony—at or about next St. Patrick's Day, and we are sure that Mr. F. W. Moore would gladly grow the specimens at Glasnevin Gardens, in case Mr. Colgan is not prepared to undertake such a large order. The editors of the *Irish Naturalist* will certainly be only too pleased to render all the assistance in their power, should Mr. Colgan decide on prosecuting his interesting inquiry. In this district (North Down), *Trifolium minus* is always regarded as the true shamrock, but a luxuriant specimen, or one in flower, is generally discarded as an impostor.—R. Lloyd Praeger.

THE FLORA OF THE SPERRIN MOUNTAINS. In the *Journal of Botany* for August I made some remarks on Prof. Murphy's unverified record of *Rubus chamamorus* on the Sperrin Mountains, on the borders of Tyrone and Derry, and described a two days' hunt that I made for the plant in July last. Mr. W. D. Donnan and I searched carefully all the summits to the west of Dart without success. The vegetation of these mountains is very limited, and mountain plants are conspicuously rare. The only plant found which is worthy of record was *Carex limosa*, which we obtained on the marshy margins of Lough Ouske, in the counties of Derry and Tyrone. It is an addition to the flora of district X. of "Cybele Hibernica," and also to the flora of Co. Derry.—R. Lloyd Praeger.

Clematis vitalba, L., ON THE NORTH BULL, DOLLYMOUNT, CO. DUBLIN. It may be of interest to note that the "Traveller's joy" has established itself amongst the sand-hills, growing with *Triticum junceum* and *Elymus arenarius*. It is also found at Drumleck on the opposite Hill of Howth, and on the sand-hills at Portraine, and at several inland stations. It is a very doubtful native, however. The Dollymount plant was growing near a bank of *Convolvulus soldanella* which was in full bloom on the 1st of August, and this alone was worth going to look at.—David McArdle, Glasnevin.

ZOOLOGY.

INSECTS.

Malachius bipustulatus, L., IN IRELAND. On the 6th of June last I obtained, by sweeping, a female specimen of this pretty beetle, in a demesne near Lucan. I believe it is an addition to the Irish list.—J. N. Halbert, Dublin.

Pæderus riparius, L., IN IRELAND. This beautiful little rove-beetle, new, I believe, to Ireland, was taken last month by Dr. Scharff at Derrynane, Co. Kerry.—G. H. Carpenter.

ABUNDANCE OF *Epinephile hyperanthes* IN CO. DONEGAL. The sudden appearance in large numbers of a particular species of insect, in a locality where it is not usually found, is a sufficiently familiar event, but one that can never lose its interest to entomologists. An instance of this kind is now afforded by the Ringlet Butterfly (*Epinephile hyperanthes*), which has this summer again become abundant in the woods of Kilderry, Co. Donegal, where it had not been observed since 1860, in which year it was also abundant. Mr. D. Campbell, of Ballinagard, informs me that he has, during this long interval, taken just one specimen there. This is a weak-winged insect, that flits about among the undergrowth of woods, and seems quite incapable of any long flight. How is its sudden re-appearance, after so many years, to be accounted for?—W. E. Hart, Kilderry, Co. Donegal.

Vannessa cardui AT ARMAGH. On June 8th, I saw a specimen of

this handsome butterfly in the garden of Mr. J. M. Watters, and shortly afterwards another made its appearance in a different part of the town. It is several years since I have seen it here.—Rev. W. F. Johnson, Armagh.

MOLLUSCA.

Limax flavus IN THE WEST OF IRELAND. In the *Irish Naturalist* for last month, Dr. Scharff, in his interesting paper on our Land and Freshwater Mollusca, says that he “has not met with *Limax flavus* on the west coast.” I have to record it from Enniscrone, Co. Sligo, where it is found in the larders and pantries of several of the bathing lodges, causing no small disgust when found in the bread crocks. *L. flavus* was not included in those I mentioned and sent to Dr. Scharff, as I have never got it *here* at Moy View. I have heard that it is numerous at Glen Lodge, the residence of Mr. A. Ormsby, near Ballina, but I have not seen it from that locality.—Amy Warren, Moy View, Ballina.

BIRDS.

OCCURRENCE OF THE WOOD-WREN (**Phylloscopus sibilatrix**) IN CO. WEXFORD. In the last issue of the *Irish Naturalist*, Mr. C. B. Moffat asks if the Wood-wren has ever been known to occur in the Co. Wexford. It has never, to my knowledge, been either obtained in or reported from this county, and its addition to our list by my friend Mr. Moffat is very welcome.—G. E. H. Barrett-Hamilton.

LONG-EARED OWL (**Asio otus**). On April 10th, while walking through a thick wood, in a particularly shady and dark part, I noticed a fine specimen of the Long-eared Owl perched on a fir-tree. Searching the locality carefully, the nest, evidently one formerly occupied by a Hooded Crow, was discovered in the ivy covering the trunk of a larch. One egg, of a dirty white, lay in it: it measured 1.75 inch × 1.40 inch (long and short diameters), and contained a young one almost completely hatched. I have never seen this bird in Co. Cork before, and do not know whether its occurrence here is rare or not.—G. E. Donovan, Timoleague, Co. Cork.

[According to Mr. A. G. More this bird is common and resident throughout the country.—Eds.]

ICELAND GULL (**Larus leucopterus**) IN KINSALE HARBOUR. It may be of interest that I observed an immature specimen of the Iceland Gull in Kinsale Harbour, on May 15th among some Herring Gulls.—H. Leyborne Popham (in *Zoologist* for July).

IVORY GULL (**Larus eburneus**) IN DUBLIN.—In the *Zoologist* for July, Mr. R. Warren expresses his opinion that the Gull recorded in the June number of that journal (and *I. N.*, p. 83), was an Iceland Gull, and not an Ivory Gull, and states his reasons.

RUDDY SHELDRAKE (**Tadorna rutila**) IN CO. DONEGAL. In the *Zoologist* for August, Mr. J. Steele Elliott records having received a female Ruddy Sheldrake from Co. Donegal. It was shot at the end of June last, and was one of a flock of twenty. The locality is not given.

SHOVELLER (**Spatula clypeata**) BREEDING IN CO. WESTMEATH. In the *Zoologist* for August, a note is contributed by Mrs. Francis J. Battersby, recording the nest of a Shoveller with eight eggs in a field near Glen Lough, Rathowen, Co. Westmeath.

THE CORN-CRAKE (**Crex pratensis**). I wonder if any readers can record such disastrous consequences to Corncrakes' nests as fell to my experience this year. Within a circle of a quarter-mile radius I found seven nests with from nine to twelve eggs in each. They were all on land being depastured by cattle. Of these No. 1 was early destroyed, a cow having lain upon it. No. 2 was trodden down by cattle when birds were almost hatched. No. 3 suffered same fate. No. 4 I lost all trace of. No. 5, young birds safely brought out. No. 6, I did not actually see

brood hatched, but believe it was, as the nest did not seem disturbed, and I found young birds afterwards in the neighbourhood; they may, however, have belonged to No. 5 nest, which was only thirty yards away. No. 6 nest was peculiar, being built in furze, and when I found it one bird was on the nest and the other sitting calling at doorway of a little tunnel about nine inches long, which led to nest. No. 7, some young hatched, but I think not all. Thus, out of seven broods, four were destroyed, and three were successful, at least partially. Cattle did the mischief to the Crakes' nests, but a Meadow Pipit's, which I found in same circle, was, I believe, robbed by boys, as two eggs first disappeared, and, ten days after, the other two were taken. With regard to the Corncrakes, I came rather suddenly upon a brood one morning, and the old bird ran off keeping within ten yards of me, and calling not at all unlike a partridge. Upon another occasion, a crake with young flew at my dog, and did not fly off until she saw me. It is the only time I have seen this occur. I have also come upon mother and young in the early morning, apparently sunning themselves in short dry grass, and it is wonderful in what an incredibly short time the little black balls disappear in all directions when disturbed, the mother darting off first, and leaving them to look after themselves.—J. H. H. Swiney.

MAMMALS.

BREEDING HABITS OF THE OTTER (*Lutra vulgaris*), AND SQUIRREL (*Sciurus vulgaris*). I should be very much obliged if any reader of the *Irish Naturalist* who has met with young Otters or Squirrels in the wild state, would kindly inform me in what month he met with them.

Bell ("British Quadrupeds," ed. 2, p. 278), says of the Squirrel that "the female brings forth three or four young in the month of June;" but the experience of Mr. Blagg and Mr. Harting (*Zoologist*, March, 1891) is opposed to this. The former gives instances of the birth of young squirrels in January and March, and the latter in March and April. I have myself met with them on the 28th of May in England, and, with eyes still unopened, so late as August 14th in this county. I imagine that, as is the case with some other rodents, such as the rabbit, rat, and hare, the date of the production of the young of the squirrel must vary more or less with the state of the weather and general food supplies. Is there any reason why, in favourable seasons, the squirrel should not breed *twice* in the year; possibly those I saw on the 14th of August were the second lot produced by the same parents that year? As regards the otter, Mr. Southwell has discovered that the young are usually produced in the winter months; is this the case also in Ireland?

Our knowledge of even the commonest Irish mammals is so very meagre that naturalists must be always glad to have small points like the above cleared up. There are other matters too which much need investigation, such as the number of young produced at a birth, the length of the period of gestation, the rate of growth and the general breeding habits. I am at present engaged in collecting information relative to the distribution and life-histories of our Irish mammalia, and should be very pleased to correspond with anyone who takes an interest in these subjects.—G. E. H. Barrett-Hamilton, Kilmanock, New Ross, Co. Wexford.

THE IRISH RAT (*Mus hibernicus*, Thomps.) ON LUNDY ISLAND. In November, 1891, I obtained a specimen of the melanistic variety of *Mus decumanus* (v. *hibernicus*) shot on Lundy Island. I believe a similar specimen has been obtained once before on the island. The specimen was perfectly black, without any white markings.—H. J. Charbonnier, Bristol.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY OF IRELAND.

Recent donations to the gardens comprise an Otter from D. R. Browning, Esq.; two Black-headed Conures from Mrs. Loftie; a Heron from Mr. G. V. Lovell; a Merlin from W. J. Williams, Esq.; a Nylghai from the Officers of the Suffolk Regiment; a Muscovy Duck from D. Maguire, Esq.; a Hedgehog from Rev. J. D. Cooke; a Sparrow-hawk from E. G. Pennington, Esq.; and two Natterjack Toads from Co. Kerry, from Dr. Walker. Two Lion Cubs were born in the gardens on the 10th August. A four-horned Sheep has been purchased. 11,700 persons visited the gardens in July.

BELFAST NATURALISTS' FIELD CLUB.

JULY 11th, 12th, and 13th.—Three-day excursion to Lough Erne, Bundoran, Ben Bulbin, and Sligo. The party proceeded on the first day to Enniskillen, and thence by steamer down Lower Lough Erne to Belleek, and by train to Bundoran, where the afternoon was spent. Next day the party, who numbered fifty, drove to Ben Bulbin, and crossed the summit of the mountain, rejoining the vehicles at Drumcliff, where the round tower and crosses were inspected. The evening was spent in Sligo, where the beautiful Dominican abbey proved the chief attraction. On the third day boats were taken up the river Garravogue and across Lough Gill to Dromahaire, where a special train was in waiting to convey the party to Enniskillen, whence they returned to Belfast. Delightful weather was experienced throughout the trip, and the members returned much pleased with their first experience of the Sligo district and its inhabitants. A number of rare plants and insects were collected.

JULY 30th.—Excursion to Benevenagh. The day was chiefly spent in botanising on this highly interesting basaltic mountain, and there was keen competition for two prizes, one for the largest collection of flowering plants, the other for the rarest twelve flowering plants collected. In the latter competition some extremely rare plants were submitted, including *Draba incana*, *Polygala vulgaris*, var. *grandiflora*, *Silene acaulis*, *Dryas octopetala*, *Salix herbacea*, and *Agrostis pumila*. The prize for the largest collection went to Miss Coulson (128 species), by withdrawal of Mr. J. J. Andrew (190 species); and in the second competition to Miss Knowles, by disqualification of Mr. Praeger, who assisted in judging.

DUBLIN NATURALISTS' FIELD CLUB.

August 13th.—Seventeen members took train to Blanchardstown, and walked thence by the valley of the Tolka to Dunboyne. The afternoon was showery, and collecting was somewhat interfered with. The most noteworthy capture was the small water-beetle, *Calambus quinquelincatus*, Zett., found in a pond near the river.

CORK NATURALISTS' FIELD CLUB.

The following excursions have been taken since those recorded in our last issue:—

JULY 13th.—To Kinsale and the Old Head, including the unrehearsed item of the wreck of the "City of Chicago."

JULY 23rd.—To Mourne Abbey, where a small party, conducted by Mr. Sullivan, of Queen's College, had a most instructive botanical ramble.

AUGUST 1st.—Bantry Bay was visited by some, and botanical and entomological specimens taken.

AUGUST 10th.—A very pleasant afternoon was spent by some members at Carrabinny Woods, Queenstown Harbour, the "take" being principally entomological.

The Irish Naturalist.

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THE ICELAND AND GLAUCOUS GULLS (*LARUS LEUCOPTERUS*, FABER: & *L. GLAUCUS*, O. FAB.) IN IRELAND.

BY ROBERT WARREN.

THE visit of Iceland Gulls to our north-west coast last winter, in such numbers, is so interesting and unusual, that I have been induced to put together a few notes of those Iceland and Glaucous Gulls that have come under my observation, with the dates of occurrence, and of capture of the specimens I obtained.

The Iceland Gull appears to have visited this part of the Irish coast (Killala Bay) much oftener than the Glaucous; though according to the late Mr. Thompson, the former bird was much the rarer up to the date of the publication of his "Natural History of Ireland," in which he mentions the occurrence of twelve specimens of the Glaucous, and only four of the Iceland Gull. On the English and Scotch coasts the Glaucous is also the more frequent visitor of the two, and this may be partly accounted for by the fact of the latter bird breeding on the coasts of Iceland, Spitzbergen, Nova Zembla, and on those of Norway, Northern Russia, and Siberia, where Messrs. Harvey-Brown and H. Seebohm met it breeding on the islands in the delta of the River Petchora; while the head-quarters of the Iceland Gull are Greenland and Arctic America, and its nearest breeding station to us is the remotely-situated island of Jan Mayen, where it was discovered breeding by Dr. Fischer of the Austro-Hungarian expedition to that island in the years 1882-1883. The Glaucous Gull being about the size of the Great Black-backed Gull, resembles it more nearly in habits and style of flight than any of its congeners, and is quite as wary and distrustful, seldom allowing the sportsman to come within shot; so unlike the Iceland, which scarcely ever shows any alarm or timidity, and is easily obtained by the shooter when met with.

When seen flying, the Glaucous can be easily distinguished from the Iceland Gull by its larger size and heavier flight,

which is so like that of the Great Black-backed Gull; while there is no gull visiting our coasts that has the graceful, gliding flight of the Iceland, owing to its superior length of wing, and although it may be sometimes difficult for the casual observer to distinguish between a small Glaucous and a large Iceland Gull (even when in the hand), yet an unerring mark of distinction between the two species is the comparative length of the closed wings with the tail. In the Glaucous the tips of the primaries barely reach to the end of the tail feathers, perhaps a little beyond in some specimens, while in the Iceland they extend from two, to two and a-half inches beyond it.

When seen flying in the company of other gulls both species can be easily recognised by their white primaries, offering such a striking contrast to the black-tipped wings of all our native gulls, and also by the peculiar-looking creamy-coloured plumage of the immature birds, especially of those in their second winter. The Iceland Gull is a very irregular visitor to our coasts, and, as far as I know, severe seasons do not appear to bring them to us in any larger numbers than mild ones, and during the hard winters of 1867-1868, 1878-1879, and 1880-1881 I never met them at all.

I first became acquainted with this rare northern visitor in Cork Harbour, in January, 1849, when a large flight of Iceland Gulls must have arrived on our southern coast, for I observed them in different parts of the harbour during that and the succeeding month of February. The first bird I noticed was on the 25th January, when returning with my brother from shooting on Seamount Marsh, and as we were passing along the embankment a splendid-looking bird flew close past us, and its white wings and creamy-coloured plumage showing almost quite white in the sunshine, at once announced it to be a stranger; but although it passed within a few yards, we lost the opportunity of securing such a rare prize, for both our guns were unloaded at that time. Again, on the 29th, when in a boat crossing the harbour from Ringaskiddy to Queenstown, we observed one flying near the guardship off Haulbowline Island, and as it wheeled round by our boat, my brother was so fortunate as to bring it down at the first shot. This bird was, I think, in the second year's plumage, and in very fine condition, weighing two pounds, and was presented to my old friend, the late Dr. J. R. Harvey of Cork, and is the bird mentioned in Mr. Thompson's third volume as the fourth Irish specimen that had come under his notice. On the 2nd February, as we were again crossing the harbour to Queenstown, two Iceland Gulls appeared near Haulbowline, and about an hour later, as we were on our way to Jamesbrook, the residence of Mr. R. W. G. Adams, when passing Cuskinny another pair were seen, but neither was obtained. Again, when returning from Queenstown on the 8th of same

month, a fine bird was seen flying along Haulbowline bank; and on the 13th we saw another near Seamount marsh. Having left the County Cork in 1851, I know nothing of the visits of this Gull to the harbour or coast since that date.

My next meeting with the Iceland Gull was near the island of Bartragh in Killala Bay, Co. Mayo, on the 4th December, 1851, when I shot a bird in immature plumage, which I sent to Belfast to the late Wm. Thompson, and the specimen, if in existence, should be in the museum there.¹ On the 9th December, 1854, I observed a bird resting on the sands near Scurmore, on the Co. Sligo side of the estuary, but although I did not succeed in coming within shooting distance, I have no doubt of its being an Iceland Gull. On the 7th May, 1855, a splendid-looking bird, apparently in adult plumage, passed close to the parlour window here, where I was sitting at the time, and as it slowly glided past I had an excellent view of it, and watched it until quite out of sight. For the greater part of January, 1862, a young bird haunted one of my ploughed fields here at Moy View, feeding on the worms turned up by the plough, and it became so tame and confiding that I did not like the idea of shooting it, and thinking that if taken alive it would prove a valuable addition to the collection of the Dublin Zoological Gardens, I laid a hook baited with raw meat in one of the furrows, and this was taken at once, but swallowed so greedily that the unfortunate bird died shortly after the hook was extracted from its throat. On the 22nd December, same year, I saw a bird on the Enniscrone Sands associating with some Herring and Common Gulls, and appeared so dark in colour as to be evidently a young bird of the year.

I shot another young bird on the 6th of January, 1866, as it was haunting one of my ploughed fields, and on the 19th of February same year, when riding along the Enniscrone Sands facing the open bay, I noticed a very dark-coloured bird with some Herring Gulls, and as it was so tame as to allow me to ride past within eight or ten yards, I had so good a view of it, that I feel certain that it was in the first year's plumage.

On the 26th January, 1873, when standing on the road near Dooneen House, talking to some friends, we were surprised at seeing an Iceland Gull flying towards us from across the fields, and alight on the high road about thirty yards from where we were standing, remain for a few moments, and then fly low along the road for a hundred yards, as if looking for food, and then across the fields out of sight.

On the 28th January, 1877, I saw a bird that I think was in the second year's plumage, resting in one of my pasture fields amongst a flock of Common and Black-headed Gulls; there had been a heavy gale the night before, and all the gulls ap-

¹ An immature Iceland Gull in the Belfast Museum, bearing no label, is no doubt this specimen.—Eds.

peared tired after it, seeming disinclined to leave the field, and when disturbed flying only a short distance and pitching again.

On the 26th December, same year, when walking along the shore at Killanly, I observed a young Iceland Gull, with a young Herring Gull, resting on the water about thirty yards from the strand, and three days after, on the 29th, being anxious to obtain some Purple Sandpipers for a friend's collection, I visited a favourite haunt of theirs on the coast about two miles below Enniscrone, on the Co. Sligo side of the bay. When about half way, I observed an immature Iceland Gull flying about a grass field where a flock of Common Gulls were resting, but as it did not come within shot, I passed on to the sandpipers' haunt; having shot some specimens I set out on my return, and when again passing by the field in which I had seen the gull in the morning, I was agreeably surprised at seeing it there still, and as it flew out over the shore, coming within easy shot, I took advantage of the chance, and brought it down with a charge of No. 5. It proved to be a bird in the first year's plumage, and was the same I had seen in the morning, a broken feather in the wing identifying it.

My next meeting with this species of gull was in November, 1887, when I shot a bird, also in the first year's plumage, that haunted one of my ploughed fields for several days in the company of Black-headed and Common Gulls, feeding after the plough. This bird was in very poor condition, for when skinning it not a particle of fat was visible on any part of the body. Since the date last mentioned no Iceland Gulls have come under my observation until the present year, when on the 9th of January, as I was walking in one of my fields near the shore, a splendid-looking bird, exhibiting the creamy-coloured second year's plumage, flew close past me along the shore, alighting on the water near the Scurmore Ice-house: and on the next day I saw it again standing on a rock near the same place. This bird was so very large that at first I thought it was a Glaucous; but its buoyant, gliding flight, showed it to be an Icelander.

On the 3rd February, when on the shore at Carrahubbock, below the village of Enniscrone, where I had gone to search for shells, I observed another bird (or probably the same) swimming about a rock-pool amongst some Herring Gulls, and it was, as Iceland Gulls usually are, very tame and unsuspicious, allowing me to approach within forty yards while it was washing and dressing its plumage. I remained for nearly half an hour looking at it through my glass, being well able to identify it by comparing its size with that of a young Herring Gull standing alongside; and also from being able to see distinctly that the ends of the closed wings extended considerably beyond the tail—an unfailing mark of distinction between the Iceland and Glaucous Gulls.

Two days after, on the 5th, as it was blowing a gale from the north-west, I walked to Enniscrone expecting to meet the

gulls (previously seen) feeding along the edge of the water, as they always do on a lee shore during a gale of wind. On reaching the sands I saw a large number of gulls, probably over a hundred, flocking into the little bay near the bath-house, where the wind and tide had drifted some floating food, and where it was retained by the eddy-tide. The gulls, crowding into such a small space, raised a tremendous row, screaming and fighting as they circled round, dipping into the water, and after a short time I observed in the midst of the crowd three Icelanders, easily recognised by their graceful flight, and creamy-coloured plumage; and as these birds flew along the edge of the water, passing close by me, I got a shot at one, knocking it down with a wire cartridge from my old muzzle-loader, but I lost the other two by forgetting to bring with me some more wire cartridges, or large shot, for although I got a shot at each, they got away wounded, for the No. 5 shot with which I had loaded, was too light to be effective at long range on birds so densely clothed with such a thick coat of feathers as the breast and under parts of these arctic gulls usually are. The bird shot was a very fine specimen in the second year's plumage, and its two companions appeared to be in the same.

(TO BE CONTINUED.)

THE PLANTS OF DALKEY ISLAND.

BY DAVID M'ARDLE.

THE excursion of the Dublin Naturalists' Field Club to Dalkey Sound and Island was full of interest to botanists. The island, which is on the south side of Dublin Bay, comprises an area of twenty-two acres, and is distant about a quarter of a mile from the mainland. The ruins of a chapel, stated to have been dedicated to St. Benedict, are interesting; the walls, built of very rough material, are still extant. The island is uninhabited; a few cattle in prime condition show the excellence of the pasture; "they are forced to swim over, and to swim back again," as the boatman informed us. The place is also considered good pasturage for sheep, and their flesh is said to acquire a peculiarly fine flavour. The geological formation is granite, in the crevices of which grow many interesting plants. The following were collected by myself and the President (Dr. McWeeney):—*Armeria maritima*, *Aster tripolium*, *Atriplex patula*, var., *Glaux maritima*, *Erica cinerea*, *Plantago maritima*, *P. coronopus*, *Sagina apetala*, *Samolus valerandi*, *Spergularia rupestris*, *Silene maritima*. The Samphire, *Crithmum maritimum*, was in full bloom amongst the rocks; it belongs to the *Umbelliferae*, and is more or less plentiful on the coasts of Europe. This is the plant alluded to by Shakespeare in *King Lear*, Act iv, sc. 6:

“Half-way down,
Hangs one that gathers Samphire, dreadful trade!
Methinks he seems no bigger than his head.”

In Shakespeare's time the gathering of Samphire was a regular trade, and in Smith's "History of Waterford" there is a description of how the people gather it, hanging by a rope several fathoms from the top of the impending rocks, as it were in the air.

There is an old story connected with the plant. A ship was wrecked on the Sussex coast, and a small party were left on the rock not far from land, but they found the sea was rising higher and higher, threatening their place of refuge. An officer who possessed some botanical knowledge, seeing a plant of Samphire growing on the rock, told them they might stay, trusting to that little plant, for the sea would rise no further, as Samphire, though always growing within the spray of the sea, never grows where it can be submerged. They believed him and were saved. The Golden Samphire, *Inula crithmoides*, belongs to the *Compositæ*, and is a rare plant, only found on the south and east coasts in Ireland. On Dalkey Island it occurs sparingly near the Martello Tower, and is noted from this locality in the "Cybele Hibernica."

Asplenium marinum now occurs sparingly, though it was once plentiful on the island; it is frequent around the Irish coast, and is often found some distance inland.

The Liverworts are few but very interesting. *Lophocolea bidentata* is abundant about the bases of the moist rocks, and *Frullania dilatata* is often found creeping over the bare rocks. *Anthelia juratzkana*, Limpr., grows in the crevices of the moist rocks (sterile). This rare plant is an addition to the Irish Flora. I first found it on the cliffs near the Bailey Lighthouse, Howth, in October of last year. I sent it to Dr. Spruce as a form of *Cephalozia divaricata*; he reminded me of the tristichous arrangement of the leaves, and said it was probably *A. juratzkana*, but that the specimens were too young for certain determination. I afterwards collected it in fruit, which settled the matter of identity. I have also gathered it this year on Ireland's Eye. The geographical distribution of the plant is interesting. It is found on the summit of Warschneck mountain, in Upper Austria, at an altitude of 2,200 feet (*Juratzka*); in Lapland at Pitensis, on Tjidsjalsk mountain (*Lindberg*, 1856); in the Grimsel Alps, Switzerland (*Schimper*, 1847); on moist rocks below the summit of Ben Nevis (fertile) (*Mr. W. West*, August, 1880). A full description of the plant will be published in my forthcoming list of Howth liverworts.

The following species of Fungi were collected by Dr. McWeeney:—*Agaricus (Psalliota) campestris*, *Marasmius oreades*, *Lycoperdon cælatum*, *L. gemmatum*, *Verticillium nanum* (on *Marasmius*), *Hysterium arundinaceum* (on grass stems and leaves).

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

(Continued from page 109.)

GASTROPODA.

*P U L M O N A T A .*GENUS—**PUPA.****Pupa anglica**, Fér.

I. II. III IV. V. VI. — VIII. IX. X. XI. XII.

This species, which was formerly believed to be peculiar to the British Islands, is abundant in some localities, but quite absent from others. It is the *P. ringens* of Jeffreys.

FOREIGN DISTRIBUTION.—South-west and north England, Wales and Scotland, Pyrenees, Portugal, and Algiers.

Pupa cylindracea, Da Costa.

I. II. — IV. V. — VII. VIII. IX. X. XI. XII.

In limestone districts especially this species is extremely common, but it also occurs on pure granite soil. To British conchologists it is perhaps better known by the more recent name of *P. umbilicata*, Drap.

FOREIGN DISTRIBUTION.—Great Britain, north Germany, south Norway, Sweden, France, Spain, Portugal, Corsica, Sardinia, Sicily, south Austria, north Italy, Dalmatia, Greece, Algiers, Morocco, Azores, Canaries, Madeira, and St. Helena.

Pupa muscorum, Müller.

I. II. — IV. V. — — VIII. — — — XII.

P. marginata, Drap., the name adopted by Thompson, is a more recent one than *P. muscorum*. It is rarer than the preceding; but Mr. Praeger met with enormous numbers of dead specimens on the sea-shore near Bundoran. I found it on the Aran Islands.

FOREIGN DISTRIBUTION.—Great Britain, throughout continental Europe, Iceland, Corsica, Siberia, Algiers and Morocco, Thibet, Turkestan, and North America.

GENUS—**VERTIGO.****Vertigo edentula**, Drap.

I. — III. IV. V. — VII. VIII. IX. X. — XII.

It requires most diligent search, especially among fallen leaves, to discover this species, but it is not uncommon in wooded districts.

FOREIGN DISTRIBUTION.—Great Britain, continental Europe (except Portugal), Sicily, Siberia, Azores, Madeira, Canaries, and Alaska.

Vertigo minutissima, Hartm.

I. — — — — — — — — — —

According to Messrs. Taylor and Roebuck (14), this species has been taken at Killarney by Mr. Hardy, but no other specimen has been found in Ireland.

FOREIGN DISTRIBUTION.—Very local in England and Scotland, throughout Europe, except the extreme north, Algiers, Morocco, and Madeira (sub-fossil).

Vertigo alpestris, Alder.

— — — — V? — — — — XII.

The occurrence of this typically alpine species in Ireland practically rests on the record of a single specimen taken at Coleraine (14). Mr. Hogan's supposed discovery of the species in Co. Dublin is very doubtful, and was not confirmed by later observers. I have never seen an Irish specimen.

FOREIGN DISTRIBUTION.—Very local in the north of England, Scandinavia, central and southern Germany, the Alps up to 6,000 feet, Hungary, and Transylvania, north Russia, Siberia, Alaska, and Canada.

Vertigo moulinsiana, Dup.

— — — — — VIII. — — — —

This species has only once been taken near Roundstone, Co. Galway, by Mr. Jeffreys (8), and by myself on the Aran Islands. The *V. lilljeborgi* of Westerlund seems to me only a variety of this species.

FOREIGN DISTRIBUTION.—South-west England, France, central Germany, south Scandinavia, Denmark, Switzerland, and north Italy.

Vertigo pygmæa, Drap.

I. II. — IV. V. — VII. VIII. IX. X. — XII.

This is the commonest of the Irish Vertigos, and is often found in very dry places.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Denmark, Germany, Russia, Caucasus, Austria, Switzerland, Italy, France, Sicily, Spain, Portugal, and Azores.

Vertigo substriata, Jeff.

— — — — V. VI. VII. VIII. — — — XII

Living specimens of this species have very rarely been taken, but I picked out over a dozen dead shells from a recent deposit found by Mr. Praeger near Bundoran, and it occurs in a similar way near Dublin.

FOREIGN DISTRIBUTION.—North England and Wales, Scandinavia, west Russia, north and south Germany, Austria, and Tyrol.

Vertigo antivertigo, Drap.

I. — III. IV. V. — VII. VIII. IX. — — XII.

Thompson (15) referred to this species as *V. palustris* (Leach), which name although more recent is very expressive, as the species is generally found in marshy places.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Germany, Austria, Transylvania, Caucasus, Turkestan, Switzerland, Italy, Sicily, France, Spain and Portugal.

Vertigo pusilla, Müller.

I. — — — V. VI. VII. — — — — XII.

Mr. Praeger obtained this very rare species in the deposit above referred to. Although it is extremely likely that the species is still living there, only dead shells were found.

FOREIGN DISTRIBUTION.—England and Scotland, south Scandinavia, France, Belgium, Germany, Austria, Transylvania, Caucasus, north Italy, Switzerland.

Vertigo angustior, Jeff.

I. — — — — VI. — VIII. IX. — IX. XII.

Like the last, this species is very rare in Ireland. It also was found at Bundoran with the preceding species by Mr. Praeger.

FOREIGN DISTRIBUTION.—North England and Scotland, south Scandinavia, Germany, France, Switzerland, north Italy, Austria, Transylvania, and south Russia.

GENUS—**BALEA**.**Balea perversa**, L.

I. — — IV. V. — VII. — IX. X. XI. XII.

This species abounds especially in the wooded parts of Ireland.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Finland, Germany, Switzerland, Austria, Italy, Sicily, France, Spain, Portugal, Azores, and Madeira.

GENUS—**CLAUSILIA**.**Clausilia laminata**, Mont.

— — — — — VII. — — X. — —

Mr. Warren was the first to find this large *Clausilia* in Co. Cavan. Its range was somewhat extended by Thompson (15), but still it has never been taken outside a very limited area, in central Ireland.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Germany, south Russia, Austria, Transylvania, Greece, Switzerland, Italy, and France.

Clausilia bidentata, Ström.

I. II. III. IV. V. — VII. VIII. IX. X. XI. XII.

Prof. Böttger, the highest authority on the genus *Clausilia*, pointed out to me that the species known to British conchologists under the name of *C. rugosa*, Drap., is identical with *C. bidentata*, Ström, which name has the priority. It is an extremely common species throughout Ireland.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Finland, Austria, Italy, Sicily, France, Spain and Portugal.

GENUS—**SUCCINEA**.**Succinea putris**, L.

I. II. — IV. V. — VII. VIII. IX. X. — XII.

Among rushes along the banks of streams and ponds this species has been met with in most parts of the country.

FOREIGN DISTRIBUTION.—Great Britain, throughout continental Europe, Thibet, Turkestan, and Siberia, while closely allied species are found in North America and Greenland.

Succinea elegans, Risso.

I. — III. — V. VI. VII. VIII. IX. X. — —

All the specimens of this species which I examined belong to what is known by continental conchologists as *S. Pfeifferi*, Rossin., but as no differences seem to have been observed in the anatomy between it and *S. elegans*, we may regard the former as a variety of the latter.

FOREIGN DISTRIBUTION.—England and Wales, Scandinavia, Finland, Russia, Transylvania, Caucasus, Turkey, Italy, Sicily, France, Germany, Switzerland, Spain, Portugal, Algiers, Siberia, and a closely allied species, *S. ovalis*, in North America.

Succinea oblonga, Drap.

I. — — — — VII. — — — —

The two forms *S. oblonga* and *S. arenaria* are generally regarded as distinct species by continental authorities, but sufficiently reliable characters have not as yet been discovered by means of which they may be separated, and I follow Clessin in uniting the two under the older name. This species has been found in very few localities in Ireland.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Russia, Germany, Austria, Transylvania, north Italy, France, Spain, Portugal, and Siberia.

GENUS—**CARYCHIUM**.**Carychium minimum**, Müll.

I. II. — IV. V. — VII. VIII. IX. — XI. XII.

In damp localities this pretty little snail seems to be abundant everywhere in Ireland.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, south Russia, Caucasus, Transylvania, Austria, Germany, Italy, Switzerland, Sicily, Corsica, France, Spain, Portugal, Algiers, and Morocco.

(TO BE CONTINUED.)

THE IRISH POST-GLACIAL ESTUARINE DEPOSITS.

BY R. LLOYD PRAEGER, B.A., M.R.I.A.

IN a paper recently read before the Royal Irish Academy (*Proceedings*, 3rd series, vol. ii. No. 2), I have described a series of Pleistocene beds which occupy considerable areas in most of the existing estuaries in the north-east of Ireland, and which possess a definite interest to the student of later Post-tertiary geology. The deposits in question lie, almost without exception, below high water mark, and are, therefore, not easily accessible, and their wet clayey nature does not invite a close acquaintance; they contain a well-preserved and varied fauna that lived on the spot where it is now entombed. In age they represent the latest page of the geological record, and correspond with the raised beaches and raised sea-beds which fringe the north-eastern shores. At Belfast especially, and at various other points on the coasts of Derry, Antrim, and Down, these estuarine deposits have received a fair share of attention from local geologists, and their extent, age, and fauna have been now well worked out.¹ Elsewhere in Ireland

¹ See Grainger—"Shells found in the Post-tertiary Deposits of Belfast," *Nat. Hist. Review*, 1859; Stewart—"Latest Fluctuations of the Sea-level on our own Coasts," and "Fossils of the Estuarine Clays of Down and Antrim," *Eighth Annual Report, Belfast Nat. Field Club*; Wright—"Post-tertiary Foraminifera of the north-east of Ireland," *Proc. Belfast Nat. Field Club*, 1879-80, *Appendix*; Bell—"Fourth and Final Report on the Wexford Gravels," *Brit. Assoc. Report*, 1891; Praeger—"Sections exposed at Alexandra Dock, Belfast," *Proc. Belfast Nat. Field Club*, 1886-87, *Appendix*; and "Report of Larne Gravels Committee," *ibid.*, 1889-90; etc.

they have apparently been overlooked (for there is little reason to suppose they are absent), and the object of the present communication is to briefly describe this estuarine series, and bring it under the notice of Irish geologists, in the hope that information as to the occurrence of similar deposits on other portions of our coasts may be forthcoming.

I shall take a typical section at Belfast (Alexandra Dock) as an illustration. Here the strata passed through in excavating for the graving dock were as follow:—

	ft.	in.
Surface clays,	6	6
Yellow sand,	2	0
Upper estuarine clay,	6	0
Lower estuarine clay,	6	0
Grey sand,	2	0
Peat,	1	6
Grey sand,	2	0
Red sand,	4	0
Boulder clay (Base not reached),	15	0
Total,	45	0

In almost every section of the estuarine beds, the Boulder clay forms the base, and it is much older than the oldest member of the series with which I am dealing. While the Boulder clay is characterized by northern and arctic forms of molluscs, the estuarine fauna presents a rather more southern aspect than that now existing in the same area. The red sand which overlies the Boulder clay at Belfast is the representative of a long period of time, during which the climate returned to something approaching its present condition, and it probably corresponds in age with the eskers of the inland counties, and with brick-earths and gravel deposits in many parts of the country; a few starved foraminifera attest its marine origin. Lying above this red sand, between two layers of grey marine sand, we meet with a bed of peat. This peat forms a well-marked zone, occurring at points all round the Irish coast, and it may be taken as the base of the estuarine series. In the north-east it occurs at a large number of localities, varying in level from above high water mark to some thirty-five feet below that level, and in thickness from a few inches to four feet. It contains an abundant flora of marsh plants, and leaves, fruit, and branches of Scotch fir, hazel, willow, alder, etc.; the first two largely predominating. The tree-stumps are usually still in the natural upright position. At Belfast the peat has yielded remains of the Red Deer, Irish Elk, and Wild Boar. The occurrence of a *Megaceros* skull in this bed is particularly interesting, as placing the submerged peat on a horizon corresponding with the marl deposits which underlie our great peat-bogs, rather than with the peat-bogs themselves, in which *Megaceros* remains seldom, if ever, occur.

We next come to a very distinct deposit which has been distinguished by the name of estuarine clay, and which is the bed to which I wish particularly to draw attention. At Belfast and elsewhere, where the series is well developed, it consists of two zones, differing considerably both in lithological features and in the character of its fauna. The lower zone consists of brownish-blue sandy marine clay, crammed with littoral shells of a limited number of species, of which *Scrobicularia piperata*, *Tapes decussatus*, *Cardium edule*, and *Mytilus edulis* predominate; the former two of these are now very rare in the north-east of Ireland. This *Scrobicularia* zone is very persistent throughout the district under consideration; it also occurs in Dublin bay, and has been recognised in England and Scotland.

The upper, or *Thracia* zone is of a different nature. The depression that had caused the submergence of the peaty land-surface and the deposition of littoral sand and mud on the top of it, then assumed a more rapid aspect; in passing from the lower to the upper zone of the estuarine clay we pass from a littoral fauna into one which would be found in a depth of five to ten fathoms of water. *Cardium echinatum*, *Scrobicularia alba*, *Lucinopsis undata*, *Montacuta bidentata*, *Thracia convexa*, *Turritella terebra*, *Aporrhais pes-pelecani*, *Scalaria turtonæ*, now become characteristic species, and a varied and exuberant fauna, pertaining to the laminarian and coralline zones, replaces the limited littoral fauna of the *Scrobicularia* clay. The beds of sand and clay which overlie the *Thracia* zone in the typical section taken, are again of a littoral character, and attest the re-elevation of the surface to its present position: they are the very latest geological deposit in our estuaries, and are, in fact, still in course of formation.

The estuarine beds, then, show a well-marked series of oscillations of level. The peat represents a period far back in Post-tertiary times (but long after the grand series of depressions and elevations that characterised the "Great Ice age"), during which the land stood higher than at present, possibly only a few feet higher in some places, but certainly 20 to 40 feet at other spots. An era of gradual depression ensued, accompanied by a deposition of littoral mud on the former land surface. This was succeeded by a further depression, which submerged the former surface to a depth of 50 to 80 feet. The final elevation which succeeded, amounted to 30 or 40 feet, and brought about the existing state of things. This series of oscillations is the latest of which we have any geological record, and occurred, in part at least, within the human period.

The raised beaches and raised sea-beds of the north-east are contemporaneous more or less with the *Thracia* beds. The same amount of depression which would account for the presence of a 5 to 10 fathom fauna in the clays, at the levels

where they are now found, would permit of the accumulation in shallow water of the stratified implement-bearing gravels of Larne, and the similar deposits at Ballyholme, Greenore, etc. Low-level raised beaches, such as that at Kilroot, would appear to have been thrown down as the land finally rose. The raised beaches, on account of their greater accessibility and convenience for inspection, have received much more attention from Irish geologists than have the estuarine clays, but I think I have shown that the latter form a far more complete and reliable geological record than can be claimed for the former.

A few notes of comparison between the fauna of the estuarine clays and that now existing in the waters of the north-east of Ireland, may possess some interest to the student of conchology. The estuarine clay fauna exhibits a rather more southern aspect than that now living: the difference is not great, and with a few exceptions all the estuarine clay species are known in a recent state in Ireland, but those species which occur in the clays, and are not members of the present fauna, are in general southern forms, so far, at least, as Ireland is concerned. Such species are *Tapes decussatus*, *Scrobicularia piperata*, *Gastrana fragilis*, *Solen vagina*, *Thracia convexa*, *Nucula sulcata*; some of these still live close to the borders of the district, such as in Lough Swilly on the west, and Carlingford Lough on the south. *Solen siliqua*, now abundant in the district, has entirely replaced *S. vagina*, which is of frequent occurrence in the clays. *Rissoa albella*, which as a recent British species is confined to Bantry Bay, swarms in the clays at a number of stations in Derry, Antrim, and Down, while *R. parva*, which is so abundant in our present waters, is found in the clays but sparingly. *Odostomia minima*, our smallest and rarest British *Odostomia*, occurs in numbers, and of comparatively enormous size, in the estuarine clay of Maghera-morne. *Jeffreysia opalina*, which is only known as an Irish shell by two dead specimens obtained in Birterbuy Bay, is not rare in the clays at various points. The estuarine clay fauna is not only varied, but exuberant, many species attaining therein a size which is not reached by living examples in the district, and which is in some cases quite abnormal.

It will be seen from what has been said that this series of deposits offers a fertile field of investigation to the geological student, and is well worthy of study, and it is to be hoped that we shall shortly learn something of similar deposits elsewhere in Ireland. A bed of undoubted estuarine clay occurs at Clontarf, from which *Gastrana fragilis*, *Tapes aureus*, and *Scrobicularia piperata* have been recorded; but there is apparently no information obtainable in regard to the presence of these clays at other spots on the coast of Ireland. I trust that this short paper may have the effect of drawing forth some additional facts, and of inducing others to carry on the investigation of the estuarine deposits of Ireland.

THE COLEOPTERA OF THE ARMAGH DISTRICT.

BY REV. W. F. JOHNSON, M.A. F.E.S.

(Concluded from page 123.)

HETEROMERA.

- Blaps mucronata**, Latr.—In cellars and outhouses—common.
Salpingus æratus, Muts.—Little Castledillon, in moss—rare.
Rhinosimus ruficollis, L.—Dean's Hill, Palace Demesne, on trees—rare.
R. planirostris, F.—Dean's Hill, Palace Demesne, on trees and in moss—pretty common.
Anaspis frontalis, L.—Dean's Hill, Palace Demesne, sweeping—rare.
A. ruficollis, F. } Mullinure, etc., in beating whitethorn and sweep-
A. maculata, Fourc. } ing—common.
Anthicus floralis, L.—Mullinure, by sweeping, also in hotbed—plentiful.

CURCULIONIDÆ.

- Apion cerdo**, Thoms.—Mullinure, sweeping—not common.
A. subulatum, Kirby.—Folly, Mullinure, sweeping—fairly common.
A. cruentatum, Watt.—Lowry's Lough, on *Rumex*—not common.
A. viciæ, Payk. } Common throughout-
A. apricans, Herbst. (*fagi*, Kirby, *assimile*, Kirby) } out district—by
A. dichroum, Bedel. (*flavipes*, F.) } sweeping and in
} moss.
A. carduorum, Kirby.—Mullinure, Drummanmore Lake, by sweeping—
rare.
A. virens, Herbst.—Common throughout district.
A. pisi, F.—Lowry's Lough, Mullinure—rare.
A. striatum, Kirby.—Mullinure, by sweeping—rare.
A. immune, Kirby.—Lowry's Lough—one specimen.
A. ervi, Kirby.—Very common throughout district.
A. gyllenhali, Kirby.—Lowry's Lough, Drummanmore—not common.
A. vorax, Herbst.—Dean's Hill, Palace Demesne—not common.
A. loti, Kirby.—Mullinure, in moss—not common.
A. tenue, Kirby.—Folly, Mullinure—not common.
A. violaceum, Kirby. }
A. hydrolapathi, Kirby. } Common throughout district.
A. humile, Germ. }
Otiorrhynchus ligneus, Ol.—Vicar's Cairn, Loughnashade, in moss—
not common.
O. picipes, F.
O. sulcatus, F. }
Strophosomus coryli, F. } Common throughout district.
Exomias araneiformis, Schrank. }
Sciaphilus muricatus, F.
Tropiphorus carinatus, Müll.—Mullinure, in moss—rare.
Liophlœus nubilus, F.—Mullinure, in moss—pretty common.
Phyllobius oblongus, L. }
P. argentatus, } Common throughout district.
P. viridiæris, Laich. (*uniformis*, Marsh.) }
Barynotus obscurus, F. } Fairly common throughout district, in moss,
B. schonherri, Zett. } etc.
B. elevatus, Marsh.
Alphus triguttatus, F.—Mullinure, Loughnashade, in moss and by
sweeping—not common.
Sitones regensteiniensis, Herbst.—Lowry's Lough, etc.—common on
furze.
S. tibialis, Herbst.—Common throughout district.

- Sitones hispidulus**, F.—Loughnashade, in moss, Mullinure, by sweeping—not common.
- S. flavescens**, Marsh. }
S. puncticollis, Steph. } Common throughout district.
S. suturatis, Steph. }
S. lineatus, L. }
S. sulcifrons, Thunb. }
- Hypera punctata**, F. }
H. rumicis, L. } Common throughout district.
H. pollux, F. }
H. polygona, L. }
H. variabilis, Herbst. }
H. trilineata, Marsh. }
H. nigrirostris, F. }
- Liosoma ovatum**, Clairv.—Mullinure, Drummanbeg Lake, in moss, by sweeping—common.
- Curculio abietis**, L.—In houses, Armagh and Killylea—not plentiful.
- Orchestes fagi**, L.—Common throughout district.
- Rhamphus flavicorins**, Clairv.—Drummanmore, sweeping—not common.
- Grypoidius equiseti**, F.—Common throughout district, in moss and by sweeping.
- Erirrhinus scirpi**, F.—Folly, in numbers on an alder bush, Mullinure, Lowry's Lough, in moss—common.
- E. acridulus**, L.—Common throughout district.
- E. æthiops**, F.—Mullinure, in flood rubbish, moss, on *Sparganium*, and by sweeping, occurs in large numbers at times. I have also taken it in moss from Lowry's Lough.
- Dorytomus maculatus**, Marsh.—Loughnashade, Mullinure, on sallows. I have bred it from sawfly catkins.
- Tanysphyrus lemnæ**, F.—Drummanbeg Lake, Lowry's Lough, in moss pretty common.
- Bagous lutulosus**, Gyll.—Lowry's Lough, in moss—one specimen.
- B. lutosus**, Gyll.—Lowry's Lough—one specimen by sweeping water-plants.
- B. glabriorostris**, Herbst.—Mullinure, Loughnashade, in moss—rare.
- Gymnetron villosulus**, Gyll.—Lowry's Lough, one specimen, sweeping water plants.
- G. labilis**, Herbst.—Dean's Hill, Mullinure, by sweeping and in moss—rare.
- Mecinus pyraister**, Herbst.—Mullinure, in moss and under bark—common.
- Anthonomus ulmi**, De G.—Mullinure, by beating whitethorn—one specimen.
- A. pedicularius**, L.—Common on flowers of whitethorn and in moss.
- A. rubi**, Herbst.—Mullinure, sweeping—not common.
- A. comari**, Crotch.—Mullinure, in moss and by sweeping—not common.
- Orobitis cyaneus**, L.—Lowry's Lough, Vicar's Cairn, in moss—rare.
- Celiodes rubicundus**, Herbst.—Mullinure, by sweeping—not common. It is plentiful at Churchill, about ten miles from Armagh.
- C. quadrimaculatus**, L.—Common throughout district on *Urtica dioica*.
- Poophagus sisymbrii**, F.—Lowry's Lough, Mullinure, etc., on water plants—common.
- Ceuthorrhynchus assimilis**, Payk.—Lowry's Lough, Mullinure, Loughnashade, in moss and by sweeping—pretty common.
- C. cochleariæ**, Gyll.—Mullinure, Palace Demesne, in moss—not common.
- C. erysimi**, F. }
C. contractus, Marsh. } Common throughout district, in moss and by
C. pollinarius, Forst. } sweeping.
- C. viduatus**, Gyll.—Lowry's Lough, sweeping—one specimen.
- C. pleurostigma**, Marsh. (*sulcicollis*, Gyll.)—Lowry's Lough, Loughnashade, Mullinure, in moss—rare.

- Ceuthorrhynchus punctiger**, Gyll.—Mullinure, Lowry's Lough, in moss and by sweeping—pretty common.
- Ceuthorrhynchidius troglodytes**, F. } Common throughout the district
Rhinoncus pericarpus, L. } by sweeping and in moss.
- R. perpendicularis**, Reich. (*subfasciatus*, Gyll.)—Lowry's Lough, Mullinure, sweeping—common.
- Eubrychius velatus**, Beck.—Lowry's Lough, on water plants—rare.
- Litodactylus leucogaster**, Marsh.—Lowry's Lough, etc. on water plants—common.
- Phytobius quadrituberculatus**, F.—Mullinure, in moss—one specimen.
- P. canaliculatus**, Fahr.—Lowry's Lough, in moss and on water plants—not common.
- Limnobaris t-album**, Loughgall, Lowry's Lough, by sweeping—not common.
- Balaninus salicivorus**, Payk. (*brassicæ*, F.)—Lowry's Lough, Mullinure, sweeping—not common.
- B. pyrrhoceras**, Marsh.—Mullinure, sweeping—rare.
- Hylastes ater**, Payk.—Dean's Hill, sweeping—rare.
- Pityogenes bidentatus**, Herbst. (*bidenæ*, F.)—One specimen in my garden.

ADDENDA.

- Stenolophus elegans**, Dej.—Lowry's Lough, under stones—rare.
- Octhebius rufimarginatus**, Steph.—Drummanmore, in flood rubbish—rare.
- Quedius maurorufus**, Grav.—Loughnashade, in moss.
- Philonthus æneus**, Rossi.—In hotbed in my garden—rare.
- Ph. carbonarius**, Gyll.—Drummanbeg Lake, Lowry's Lough, in moss—rare.
- Stenus picipes**, Steph.—Lowry's Lough, by sweeping—rare.
- Neuraphes elongatulus**, Müll.—Mullinure, in moss—rare.
- Scaphisoma agaricinum**, L.—Lowry's Lough, sweeping—furze.
- Telephorus nigricans**, Müll.—Loughgall Manor Demesne—sweeping.
- Ochina hederæ**, Müll.—Loughgall Manor Demesne—sweeping.
- Crepidodera rufipes**, L.—*Vide I. N.*, p. 122. I have taken a large number on *Vicia* in Drummanmore.
- Ceuthorrhynchidius floralis**, Payk.—Little Castledillon, Drummanmore and in a garden, in moss and by sweeping.

CORRIGENDUM.

Page 58, line 20 from bottom, for **Q. attenuatus**, Gyll, read **Q. boops**, Grav.

NOTES.

BOTANY.

PHANEROGAMS.

WHITE CENTAURY (**Erythræa centaurium**) IN CO. CORK. I enclose a specimen of *white* Centaury which I have lately found on the roadside here. The rose-coloured Centaury, *Erythræa centaurium*, is very common, but I have never seen the white before, and shall be glad to know if it is considered rare, and its exact name?—J. H. Bennett, Monkstown, Co. Cork.

Erythræa centaurium is a very variable plant, the colour of the flowers is usually pink inclining to red. The white form is not recognised as a distinct variety, but we have a specimen collected on the Hill of Howth, Co. Dublin, by the late Dr. Moore, which he named *E. centaurium* var. *album*.—D. M'Ardle, Glasnevin.

Specularia hybrida IN CO. DUBLIN. Towards the end of July last, while botanizing in the neighbourhood of Baldoyle, I found several

plants of this species growing with *Papaver argemone* and *P. hybridum* in a wheat-field alongside the Howth railway line. As there would appear to be no previous Irish record for the *Specularia*, which is widely distributed in eastern England, it may be worth while to note here what is perhaps the first appearance of the species in Ireland. The Baldoyle specimens bore abundance of mature seeds, and it would be of considerable interest to observe whether the species succeeds in maintaining its ground in this station. In their description of the species, none of the authorities I have consulted, English or Continental, make any reference to the peculiar pair of bracts, placed about the middle of the capsule, which are a marked feature in the Baldoyle plant.—Nathaniel Colgan, Dublin.

Spiranthes romanzoffiana IN THE NORTH OF IRELAND. To the *Journal of Botany* for September, Mr. R. Lloyd Praeger contributes an article on the recent discovery of this extremely rare plant in the north of Ireland, which it has recently been his good fortune to make. This orchid, whose only previously known stations are Kamtschatka and Co. Cork, grows in Co. Armagh, on a wet worked-out bog, where its appearance is described by Mr. Praeger as being somewhat different from that of the Cork plant. The finding of this species in the north of Ireland is a highly interesting botanical discovery, and is a very big feather in the cap of our northern botanists. We are glad to observe that the discovery was made during the field-work entailed by the preparation of a paper for the *Irish Naturalist* on the Flora of Co. Armagh, which will shortly appear in our pages.

ZOOLOGY.

I N S E C T S .

BUTTERFLY REAPPEARANCES. By a curious coincidence, the September number of *Irish Naturalist* contains two notes on recent reappearances of butterflies, Mr. W. E. Hart recording a "burst" of the Ringlet Butterfly in Donegal, after an interval of thirty-one summers, while the Rev. W. F. Johnson reports from Armagh the reappearance, after several years' absence, of the "Painted Lady." As a supplemental note I may add that the "Greasy Fritillary" (*Melitæa aurinia*) reappeared this season in a small patch of boggy ground at Ballyhyland, in which it was very plentiful from 1877 to 1883, and sought for in vain by me every summer since until the present year. The insect has three other localities within about five miles; but as there are a score of intermediate spots, to all appearance quite as suitable to its habits, which it does not frequent, I am at a loss to account for its return to the favoured piece of ground above referred to. When I repaired to the locality this year it was towards the end of the fritillary's season, and I saw but two sadly battered and broken-down specimens; but these were enough to satisfy me that *M. aurinia* had once more flourished in her long-deserted haunts.

The Ringlet Butterfly is here one of our commonest species, in shady places almost vying with the Speckled Wood (*Pararge ægeria*) in profusion; but though accustomed to see it thus plentiful, I took note of its particular abundance in July last, more than one of its congeners having struck me as less common than usual this year. About Dublin the Ringlet would seem to be somewhat more local, but I have seen it swarming beside the Royal Canal not more than seven or eight miles from town, and seeing that our museum authorities until recently labeled it "rare in Ireland," I feel sure that notes on its distribution throughout other parts of the country would be very welcome.

Apparently it is a creature of strongly gregarious predilections, and I venture to put forward the view that in a season of exceptional increase its larvæ may find it expedient to migrate in large numbers. That many caterpillars are very methodical in their migration is well known. There are difficulties in the way of every explanation of insect-swarms; it seems impossible to find one fitting the extreme cases. But if Mr. Hart could

ascertain the nearest constant habitat to Kilderry of *Epinephile hyperanthes* we might be in a better position to judge of the tenability of this suggestion. Imago migration will not plausibly explain the appearance, if unheralded, of a swarm of fresh-looking specimens, least of all in the case of so delicate and short-lived a fly as *E. hyperanthes*.—C. B. Moffat, Ballyhyland, Co. Wexford.

FISHES.

THE BLACK-FISH (*Centrolophus pompilus*), IN DINGLE BAY. A specimen of this very rare fish was recently captured in a mackerel-net at the entrance of Dingle Bay, and was forwarded to me by the Rev. Mr. Anderson. This is the second occurrence of the fish in Irish waters, the first specimen having also been taken in Dingle Bay, by the late Mr. W. Andrews. Both of them are now in the Dublin Museum. *C. pompilus* ranges from the Mediterranean along the Portuguese coast, the west coast of France, and south-west coasts of England and Ireland.—R. F. Scharff, Dublin.

BIRDS.

THE LONG-EARED OWL (*Asio otus*) AS A RESIDENT IN CO. CORK. In answer to Miss Donovan's question, (*I N.*, p. 126) I may say, that I have found this species nesting in most of the suitable woods in east Cork, where I have looked for it. I have also seen the bird, and found the pellets in woods where I was unable to find the nest.

A good many specimens from different parts of the county are sent to the taxidermists from time to time. The finding of only one egg in the nest, nearly hatched, is not an uncommon occurrence, and I think may be accounted for by Hooded Crows.—W. B. Barrington, Cork.

The Long-eared Owl is the commonest species of owl in all the wooded parts of the county, and is especially numerous in the wooded demesnes in the vicinity of the harbour, and notably so in Coolmore demesne. I have generally found the young in the old nests of Magpies, or Rooks, generally in the densest tracts of the woods.—Robert Warren, Moy View, Ballina.

SUPPOSED EGGS OF SHELDRAKE (*Tadorna cornuta*) FROM LOUGH ERNE. I have to apologise to Mr. Praeger for want of deliberation in determining an egg he sent me, one of two that he obtained among long grass on the top of Bess Island in Lough Erne, and which he believed to be those of Shel Drake (see *I N.*, p. 111).

From the size and whiteness of the egg, which led me to acquiesce in this conclusion, one might at first suppose it to be a Shel Drake's; but the fact of the nest being found, not in a burrow, but in the open, on an island in a freshwater lake so far from the sea, coupled with the absence of information as to the appearance of the parent bird or of the down in the nest (an invaluable criterion), make it impossible to say with certainty whether the eggs were laid by a Shel Drake or by an escaped domestic duck. I believe there is no instance on record of the Shel Drake breeding elsewhere than in a burrow, or, exceptionally, in very dense furze. Mr. Praeger's eggs measure 2.72 in. × 1.87 in., and 2.5 in. × 1.8 in., the larger one tapering at both ends. They are pure white, destitute of the creamy tint and smoothness of Shel Drake's eggs in my collection. This is an instance of the danger of giving an opinion as to the species of eggs, the parentage of which has not been ascertained upon the spot.—R. J. Ussher, Cappagh Co. Waterford.

THE LITTLE STINT (*Tringa minuta*, Leister) AT INCH, CO. DONEGAL. I have to record a couple of these interesting little waders, which were shot on Saturday, 3rd Sept., and submitted to me for identification. They had evidently just arrived, as they were described by the person who shot them as being very tame. They were solitary, and were sprung from a small piece of flooded meadow-land not far from the shore.—T. D. Bland, Londonderry.

THE SPOTTED REDSHANK (*Totanus fuscus*) IN IRELAND. To the *Irish Sportsman* of August 20th, Mr. Robert Warren contributed an interesting article on this subject. He gives particulars of the five specimens obtained in Ireland, and describes his various hunts after the species, which has visited the Moy estuary on frequent occasions.

BLACK-TAILED GODWIT (*Limosa belgica*) ON LOUGH SWILLY. Several of these birds have recently visited the Reclamation Slob, at Inch, Lough Swilly. One, shot by my son, Mr. H. A. Leebody, on August 18th, I have had preserved. He secured another specimen on August 29th. The Bar-tailed Godwit is common enough at Inch in September and October, but I have not previously noticed the Black-tailed.—J. R. Leebody, Londonderry.

OCCURRENCE OF THE RUDDY SHELDRAKE (*Tadorna rutila*) IN CO. CORK. An adult female of this species was shot in Cork Harbour on the 4th August, out of a flock of three. The plumage was in perfect condition, and showed no traces of its having been in captivity. I do not know of any ornamental water in the neighbourhood, where the birds could have escaped from. It is probable that owing to the widespread occurrence of this species over the British Isles the last few months, that there may be other small flocks along the southern coast of Ireland, which have escaped observation, or have not been recorded.—W. B. Barrington, Cork.

RUDDY SHELDRAKES (*Tadorna rutila*) IN IRELAND. Ruddy Shel-drakes continue to be reported from various parts of this country, as well as from England and Scotland, and there would appear to be reason to suppose that a flock of wild birds from the far east has visited our shores; a number of letters discussing the wild or domestic origin of the strangers will be found in the last few issues of the *Field*. The *Irish Sportsman* of July 23rd, contains notice of a flock of seven on the Dublin coast; Mr. H. C. Levinge reports to Mr. Ussher (*Zoologist* for September) two in Co. Westmeath; Mr. W. A. Hamilton records three at Coolmore, Ballyshannon (*Field*, August 20th); and Mr. D. C. Campbell writes that a flock of six were seen at Inch, Lough Swilly, of which one was shot (*Field*, August 27th).

MAMMALS.

HYBRID BETWEEN HARE AND RABBIT (*Lepus variabilis* and *L. cyniculus*). In the month of June a specimen of a curious hare was forwarded to me from Tullintrain, Co. Derry. It was considered by the sender to be an unheard of occurrence—a cross between a rabbit and hare. I think these hybrids partake more of the nature of a hare; in that they do not burrow, run very quickly, and are said to be even more difficult to kill than the ordinary hare. The one now in my possession is like a hare in general shape and size, with long legs; also the fur along the chest and under parts is that of a hare. It resembles a rabbit in shape and size of head and ears. The fur on head and along the sides and back, is greyish brown, like that of the wild rabbit. The tail is about three inches long and almost white. This specimen, when living, was caught by greyhounds, and its voice was said to be like that of a hare. I will be pleased to hear if any readers of the *Irish Naturalist* have come across instances of hybrids between these animals, with any remarks as to their habits, etc.—Arthur J. Collins, Belfast.

NOTICE.

A series of papers on “The Earthworms of Ireland,” will be commenced in the January number of the *Irish Naturalist*, by REV. HILDERIC FRIEND, F.L.S., of Idle, Bradford, Yorkshire.

MR. FRIEND will be grateful for worms from all parts of the country. They should be sent alive in damp earth or moss, in metal boxes. Packages should be marked “Natural History Specimens.”

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations comprise fourteen lizards from J. A. Abbott, Esq.; a Heron from Master Monson; a Syrian Rat from H. Napier, Esq.; a Parrakeet from C. R. C. Tichborne, Esq.; two Guinea-pigs from the Misses Ponsonby; a Monkey from S. Grey, Esq.; a Peregrine Falcon from J. Deane, Esq.; and a Gannet from F. C. Wallace, Esq. A Grizzly Bear and two Angora Goats have been purchased. About 16,000 persons visited the Gardens in August.

BELFAST NATURALISTS' FIELD CLUB.

AUGUST 13th.—Half-day excursion to Giant's Ring and Drumbo. A party of over sixty drove out and visited the interesting prehistoric site of Giant's Ring, and the ruined round tower at Drumbo.

AUGUST 27th.—Excursion down the Lagan Canal. A party of no less than 120 took train to Moira, where horses and boats were waiting, by aid of which a delightful water-journey of twenty miles was made back to Belfast. A prize for the best collection of aquatic plants was won by Mr. R. Hanna. Among the best species obtained during the day were *Acorus calamus*, *Cicuta*, *Butomus*, *Sagittaria*, *Hypericum dubium*, *Equisetum hyemale*, *Orthotrichum sprucei*.

SEPTEMBER 10th.—Half-day excursion to Knockagh, when a large party spent an instructive afternoon examining the cliffs and slopes of this fine basaltic hill. The season was far advanced for botanising, but some good plants were obtained.

DUBLIN NATURALISTS' FIELD CLUB.

SEPTEMBER 3rd.—Twenty-four members joined the excursion to Dalkey Sound and Island. A high wind and rough sea rather interfered with the dredging operations, but several hauls were taken off the southern shore of the island. A number of common hydroids, polyzoa, and shells were obtained; noteworthy captures were two perfect specimens of the small bivalve *Astarte triangularis*, Mont.; this shell is local and rare on the Irish coasts. Thompson mentions that a single living specimen was obtained at Dalkey by dredging in 1840, and this is the only record given in the "British Association Guide to the Fauna of Dublin, etc." 1878. Turton, however, has recorded the var. *minutissima*, Max., from Dublin Bay and Portmarnock. Among numerous common echinoderms, two young specimens of *Solaster papposa*, L., were remarkable, each about $\frac{1}{4}$ in diameter. One of the specimens has thirteen rays, but the other only eleven, which is an unusual number for this species. The pygogonid, *Nymphon rubrum*, Hodge, was dredged; this species does not seem to have been before recorded in Irish waters, it has been found off the Norwegian and northern British coasts.

The botanical results of the excursion are given in Mr. McArdle's paper (p. 133). On account of the high wind, there were hardly any insects stirring, but, considering the small size of the island and the absence of wood, the spider-fauna was found to be varied; *Epeira diademata* and *Zilla atrica* had their webs on the faces and in the clefts of the granite rocks, the latter species being singularly abundant; *Lepthyphantes tenebricola* and *Anaurobius fenestralis* occurred sparingly; but it was hardly possible to turn over a stone without finding *Textrix denticulata*. The only harvest-man observed was *Phalangium opilio*.

The members were kindly entertained at tea by Mr. T. H. Webb, and a microscopic demonstration of some of the species obtained was afterwards given by Prof. Haddon.

The Irish Naturalist.

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No. 8.

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

(Continued from page 109.)

GASTROPODA.

PULMONATA.

GENUS—ALEXIA.

The introduction of this, and the next genus among the Land and Freshwater Mollusca, may seem to many conchologists somewhat out of place; but it must be remembered that these genera contain no truly marine forms. All the species of *Alexia* and *Melampus* inhabit brackish water, and they are very closely allied to *Carychium*.

Alexia denticulata, Mont.

— II. — — V. — — — IX. — — XII.

Although probably more widely spread round the coast, it has only as yet been recorded from a few localities.

FOREIGN DISTRIBUTION.—England, Wales, and west coast of France.

GENUS—MELAMPUS.

Melampus bidentatus, MONT.

— — — — V. — — — — XI. —

According to Thompson (15) this species is “general along the coast of Ireland,” but he mentions no particular localities. It occurs at Portmarnock (5), and Sheephaven (Hart).

FOREIGN DISTRIBUTION.—Coast of Great Britain, north and west coast of France, Mediterranean, Adriatic, and coast of Madeira.

GENUS—OTINA.

To judge merely from habitat, this genus might reasonably be included among the marine Mollusca, as it is by many conchologists, but the family *Olinidae* to which it belongs includes several terrestrial and freshwater forms, the genus *Otina* being the only one which has adapted itself to salt-water, as it lives between tide-marks.

Otina otis, Turton.

— — — — — VI. — VIII. — — — —

Thompson (15) placed this species under the genus *Velutina*, but the only British species (*V. lævigata* and *V. plicatilis*) belong to quite a different family. Prof. Harvey was the first to discover *O. otis* at Milltown-Malbay on the Clare coast, and it has since been found on the Galway coast (15).

FOREIGN DISTRIBUTION.—South coasts of England and Wales, Isle of Man, Arran, N. B., north and west coasts of France.

GENUS—**AMPHIPEPLEA**.**Amphipeplea glutinosa**, Müller.

— — — — — V. — VII. — — — — XII.

This was not known to Thompson (15) as an Irish shell, but Mr. C. Ashford (14) found it abundantly under the leaves of the Water Lily in several parts of Ireland, and it is reported (5) to have been found in the Grand Canal Harbour in Dublin.

FOREIGN DISTRIBUTION.—England, Sweden, north and south Germany, north France, Galicia, and Syria.

GENUS—**LIMNÆA**.**Limnæa stagnalis**, L.

— — — — — V. VI. VII. — XI. X. — XII.

This species has never been taken in the south-west or north-west of Ireland, but in eastern Ireland, and especially around Dublin, it is fairly common.

FOREIGN DISTRIBUTION.—England, south Scotland, Scandinavia, Finland, Russia, Germany, France, Switzerland, Austria, Transylvania, Turkey, Caucasus, north Italy, Siberia, and North America.

Limnæa auricularia, L.

I? — — — — — V. VI. VII. VIII. — X. — —

This species, like the last, is not common, and appears to be quite absent from the south-west and north-west of Ireland, the only record from the former region being doubtful (7).

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, France, Germany, Switzerland, Italy, Sicily, Spain, Portugal, Algiers, Morocco, Cape Verd Islands, Siberia, and North America.

Limnæa involuta, Harvey.

I. — — — — — — — — — —

A short description of the anatomy of this interesting mollusc has been given by Goodsir (4), but a more minute investigation is much needed. It was first discovered in 1832 by Mr. Harvey, in Crimcaun Lake, on the Cromaglaun Mountain, near Killarney. It has never been found anywhere else, but a closely allied species, *L. burnetti*, occurs in Wales and Scotland.

Limnæa peregra, Müller.

I. II. III. IV. V. VI. VII. VIII. IX. X. XI. XII.

The fact that this species has been recorded from every district in Ireland shows that it is very common, and it is so variable that scores of

named varieties are known to conchologists. A very remarkable variety has recently been discovered by Mr. R. Patterson in Lough Salt, Co. Donegal.

FOREIGN DISTRIBUTION.—Great Britain, Faroe Islands, Iceland, Sicily, throughout continental Europe, Siberia, and North America.

***Limnæa palustris*, Müller.**

I. II. — — V. VI. VII. VIII. IX. X. XI. XII.

Like the last, this species probably occurs throughout Ireland, but it is not by any means so common.

FOREIGN DISTRIBUTION.—Great Britain, and throughout continental Europe, Algiers, Morocco, Siberia, and North America.

***Limnæa glabra*, Müller.**

I. — — — — — — — — — — XII.

This is a very rare species, and has hitherto only been found near Cork and Belfast.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, north Germany, France and Spain.

***Limnæa truncatula*, Müller.**

I. II. — IV. V. VI. VII. VIII. IX. X. XI. XII.

This, the smallest species of *Limnæa*, is often found at very considerable elevations in mountain springs, but occurs less commonly on the plain.

FOREIGN DISTRIBUTION.—Great Britain, Iceland, throughout continental Europe, Algiers, Morocco, Canaries, Madeira, Siberia, and North America.

GENUS—**PHYSA.**

***Physa fontinalis*, L.**

I. II. — IV. V. VI. VII. — IX. X. — —

According to Thompson (15) this species is common, and generally distributed over Ireland, but I myself do not quite share his opinion, as I have rarely met with it.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Germany, Transylvania, Austria, Switzerland, Italy, France, Spain, Siberia, and North America.

GENUS—**APLEXA.**

***Aplexa hypnorum*, L.**

I. II. — — V. VI. — VIII. IX. — — —

This species has generally been united with *Ph. fontinalis* under the genus *Physa*, but it differs in the mantle being devoid of the fringes, and scarcely reflected over the shell. It is rather local in Ireland, but has been recorded from both the west and east coast and Achill Island.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Transylvania, Austria, Switzerland, France, Spain, Siberia, and North America.

GENUS—**PLANORBIS.****Planorbis corneus, L.**

I? — III. — V. VI. — — — —

The largest Irish species of *Planorbis*, this is also one of the rarest, and inhabits a comparatively small tract in central Ireland. The Dingle record, mentioned by Thompson (15), has not been confirmed, and remains doubtful.

FOREIGN DISTRIBUTION.—England, south Scandinavia, Russia, Transylvania, Austria, Germany, France, north Italy, Corsica, and west Siberia.

Planorbis marginatus, Drap.

I. II. — — V. VI. VII. — — X, XI. XII.

This has a much wider distribution in Ireland than the last, but becomes rarer in the west. It is probably *Pl. umbilicatus* of Müller and Thompson.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Transylvania, Austria, Switzerland, Germany, Italy, Sicily, France, Spain, Portugal, Algiers, Morocco, and west Siberia.

Planorbis carinatus, Müller.

I. II. III. — V. VI. VII. — — X. — XII.

As Thompson (15) has already mentioned, this species is much less common than the preceding. It frequents the same localities, viz:—stagnant waters.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Germany, Austria, Switzerland, France, north Italy, Spain, and Portugal.

Planorbis vortex, L.

I.? — — — V. VI. VII. — — X. — —

The record by Humphreys (7) seems to me doubtfully referable to this species, and although Thompson (15) considered it generally distributed, our present knowledge of the distribution does not warrant such a belief.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Transylvania, Austria, Switzerland, Germany, Italy, France, and Siberia.

Planorbis spirorbis, L.

I. II. III. IV. V. VI. VII. — IX. — — XII.

This is one of the most generally distributed species of *Planorbis* in Ireland.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Transylvania, Austria, Switzerland, Italy, Germany, France, Spain, Portugal, Algiers, and Morocco.

Planorbis contortus, L.

I. II. — — V. VI. VII. VIII. IX. — XI. XII.

Like the last, this may be looked upon as generally distributed over Ireland.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Finland, Russia, Transylvania, Austria, Germany, Switzerland, Italy, France, Spain, Portugal, Siberia, and Kamschatka.

Planorbis albus, Müller.

I. II. — — V. — VII. VIII. IX. X. XI. XII.

According to Thompson (15) this species prevails generally over Ireland.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Finland, Russia, Transylvania, Austria, Switzerland, Germany, north Italy, France, Spain, Portugal, Thibet, China, Siberia, and North America (*P. hirsutus*, Gould).

Planorbis glaber, Jeffreys.

— II. — — V. — VII. VIII. — — XI. XII.

Alder described this species as *P. levis* about the same time as Jeffreys, and under this name it is mentioned by Thompson (15). *Pl. parvus* of Say, a North American species, if not identical with *Pl. glaber*, is very closely allied.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, north and south Germany, Bohemia, Hungary, Belgium, Corsica, Sardinia, Sicily, Algiers, Morocco, Madeira, and west Siberia.

Planorbis crista, L.

— II. — — V. — — VIII. IX. — — —

Pl. imbricatus, the name adopted by Thompson (15), and also *Pl. nautilus* are more recent designations for the same species. It is the smallest Irish species of *Planorbis*.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, south Russia, Transylvania, Austria, Switzerland, Germany, France, Italy, Sicily, Spain, Portugal, Algiers, and Morocco.

Planorbis fontanus, Lightf.

I. — III. — V. VI. VII. — IX. — XI. XII.

What was looked upon as *Pl. nitidus* by Jeffreys, Thompson, and others, is this species. The real *Pl. nitidus* of Müller is the next.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, south Russia, Caucasus, Transylvania, Austria, Switzerland, Germany, France, Spain, Portugal, Algiers, Morocco, Tibet, and Siberia.

(**Planorbis nitidus**, Müller.)

Thompson (15) records this species as Irish on the authority of Humphreys, who is said to have found it in Tipperary, but as no other Irish collector has found a specimen since, and the original does not seem to be in existence now, I think I am justified in excluding it from the Irish list.

GENUS—**ANCYLUS**.

Ancylus fluviatilis, Müller.

I. II. — IV. V. VI. VII. — IX. X. XI. XII.

This is an extremely common species, and occurs in small streams close to the sea-shore as well as high up on mountains.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Transylvania, Austria, Germany, Switzerland, Italy, Sicily, France, Spain, Portugal, Algiers, Madeira, and Canaries.

Ancylus lacustris, L.

— — — — V. VI. VII. — — X — XII.

Although we have only few records of this species from Irish localities it will probably be found to be more generally distributed.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, south Russia, Caucasus, Transylvania, Austria, Switzerland, Germany, France, and Italy.

THE ICELAND AND GLAUCOUS GULLS (*LARUS LEUCOPTERUS*, FABER: & *L. GLAUCUS*, O. FAB.)
IN IRELAND.

BY ROBERT WARREN.

(Concluded from page 133.)

I NOW give my notes of the occurrence of the Glaucous Gull. The first occasion when I met this fine northern Gull was during a heavy fall of snow, on the 14th December, 1859, when as I was walking along the shore here at Moyview looking out for a shot at Wigeon, a splendid bird flew close past me, and although I fired and severely wounded it, it unfortunately escaped, and I thus lost my first chance of securing such a prize.

This bird when passing appeared quite as large as the Great Black-backed Gull, and its heavier flight easily distinguished it from the Iclander. In March, 1871, on two occasions, I saw an adult bird flying about the sands of the estuary, and although I got a long shot I did not secure it. This individual showed very white when seen through a glass, the grey mantle being very pale in colour, almost pure white, a peculiar stage of plumage sometimes seen in this gull just before it assumes the perfect one of maturity.

Several times during January, 1873, I observed another adult bird haunting the shores and sands, and at length on the 23rd of same month I succeeded in shooting it, near Ballysokeery, on the Co. Mayo side of the estuary. I was returning in my shooting punt, having been after the Wigeon all day, when I remarked this bird flying past and joining some young Black-backed Gulls resting on the water; these latter on the approach of the punt as usual made off, leaving the Glaucous still on the water, but when I got within shot my small gun missed fire, and then bringing round the head of the punt, so as to get the big gun to bear, I fired and knocked over one of the finest specimens of the Glaucous Gull that I ever saw; it was in perfect adult plumage, showing a little of the winter dusky colour on the back of head and neck. Its measurements were: total length from point of bill to end of tail, $26\frac{1}{2}$ inches; carpus, 18 inches; tarsus, 3 inches; bill from point to rictus, $3\frac{3}{4}$ inches; to forehead, $2\frac{1}{4}$ inches; and depth 1 inch. Some time during the winter of 1874 or 1875 (I am not certain which, for I did not note the occurrence), I shot an immature bird near the island of Bartragh. On the 24th of February, 1877, I observed a fine adult bird flying along the shore here, and on the 20th of March, as I was down the Moyne Channel in my shooting punt, and when just opposite the Abbey a beautiful Glaucous Gull (probably the same seen in February) flew close past my

boat, and being unable to resist the wish to obtain it I brought it down by a shot from my cripple-stopper. This was a lovely specimen in adult plumage, and the only trace of immaturity about it was a small darkish spot on the end of the bill. The irides of the eyes were exactly of the same yellow colour as those of a pair of adult Herring Gulls shot the same day. My next meeting with this gull was on the 17th of January, 1878, when returning from Wigeon shooting at Bartragh, I observed a young Black-backed Gull on the rocks near Scurmore feeding on some garbage left by the tide, and just then a young Glaucous flying past, observing it feeding, wheeled round to join in the feast, but was at once driven off by the Black-back, and failing after several attempts to obtain some of the food, flew off along the shore about a hundred yards or so to where a dead dog was lying. It began feeding on the carcase so greedily that it took no notice of my punt until I had come close within shot, and then as it made off, I knocked it over. It proved to be a very fine specimen in the first year's plumage, and although quite as large and as powerful in appearance as the Black-back, was too cowardly to fight for its share of the food.

The last time I had the pleasure of seeing a Glaucous Gull was in February, 1880, when I remarked one flying near the landing-place on the shore here, having been attracted by the carcase of a bullock left by the tide; here it remained for some days in company with Black-backs, feeding on the carcase, and although I made several attempts to shoot it, its excessive watchfulness quite baffled me until the 27th, when I at last succeeded in bringing it down as it flew off from the carcase. This is the handsomest adult specimen of the Glaucous Gull I have ever seen, snowy white, with the exception of the pale grey mantle and light yellow bill and irides, offering such a pleasing contrast of colour to the pure white of the head and neck. It is also one of the largest birds I have examined, measuring nearly 29 inches in length, the carpus quite 18 inches, while the tips of the closed wings barely reached to the end of the tail feathers. It weighed three and a-half pounds.

The habits of the Glaucous and Iceland Gulls described by Faber, as observed by him in Iceland (quoted in Yarrell's 3rd vol.), coincide very much with what I have seen of these gulls, the Glaucous being exactly a Great Black-backed Gull in everything except colour; its habits and disposition are the same, feeding on young or wounded birds, and on any carcases left on the shore. The Iceland Gull's habits, on the other hand, are those of the Herring and Common Gulls with which it associates, often resting and feeding in fields, and following the plough for worms turned up; I never saw an Iceland Gull feeding on carrion, nor approaching a carcase, although such were on the shore during the visits of this gull to the estuary.

THE CHARACTERISTIC PLANTS OF CO. WEXFORD.

BY G. E. H. BARRETT-HAMILTON AND C. B. MOFFAT.

IN the following paper an attempt has been made to present a list of the more interesting of the indigenous or fully established species comprised in the Flora of the Co. Wexford. Since the publication of the "Cybele Hibernica," and its Supplement, the principal additions made to this subject are two papers by Mr. H. C. Hart,¹ dealing with the flora of the Wexford coast, and with that of the banks of the Slaney. Miss L. S. Glascott, of Alderton, and the writers of this paper have also contributed some local lists to the *Journal of Botany*, relating principally to that part of the county which lies between the rivers Slaney and Barrow; while a few species are recorded for the first time in the present paper. The total number of plants ascertained to occur in the county is 630, but it is probable that many additions remain to be made, particularly in the north-eastern section.

The County Wexford, forming as it does the eastern extremity of Watson's Atlantic type in Ireland, is somewhat richer than might have been expected in species generally referred to that group; of the forty-three Irish representatives, twenty-three occur here, while the inclination to Atlantic appears in at least two others of our characteristic plants. On the other hand, out of the seventeen Germanic plants known to occur in Ireland, we have but one,² for there appears but little hope of verification for the old record of *Lythrum hysopifolium* contained in Mackay's "Flora Hibernica." Of Watson's Highland type, it is remarkable that not one species has been discovered, three species "inclining to Highland" constituting our nearest approach to a sub-alpine flora, in a mountain-range whose highest elevation exceeds 2,600 feet. Six (or one in eleven of the Irish) species represent the Scottish and Intermediate types, while three other species inclining to the Scottish, and four to the Germanic type, complete our list of plants interesting by reason of their limited geographical range in Great Britain. A desire to reduce the compass of the paper has led to the exclusion of many uncommon species found within the county, but in our view hardly entitled to rank as characteristic. Vagrant colonists on cultivation, or casual occupants of patches of waste ground, with others which, though somewhat rare,

¹ H. C. Hart: "A Botanical Ramble along the Slaney and up the East Coast of Wexford."—*Four. of Botany*, Nov. 1881; "Report on the Flora of the Wexford and Waterford Coasts."—*Proc. R. D. S.*, vol. iv. (n. s.), part 3, October, 1883.

² *Orchis pyramidalis*, whose type is held to be doubtful by some high authorities.

might be expected to occur here and there in most parts of Ireland, are, as a rule, omitted.

The signs † ‡ and * are used below, as in the "Cybele Hibernica."

Thalictrum minus, Linn., var. **maritimum**. Sandhills of east coast. Arklow to Cahore Point (Hart).

Ranunculus peltatus, Fries.—Abundant in streams in north Wexford (C. B. M.).

R. cœnosus, Guss.—Frequent.

R. lingua, L.—Alderton (Miss Glascott).

Matthiola sinuata, R. Br.—Ballyconigar, and near Gorey (*Cyb. Hib.*), Tinnyberna, and below Kilmuckridge (Hart).

Cochlearia danica, Linn.—Locally plentiful on south coast.

C. anglica, Linn.—No doubt the *Cochlearia* of the estuaries of both Slaney and Suir; grows plentifully in many localities from Rosslare to Macmine junction on the Slaney, and extends up the Barrow from Kilmanock to New Ross.

Lepidium smithii, Hook.—Frequent throughout the country.

† **Senebiera didyma**, Pers.—New Ross (*Cyb. Hib.*), Churchtown, Baginbun, and Duncannon (Hart); Fishertown (G. E. H. B. H.).

Raphanus maritimus, Sm.—Ballyconigar (*Cyb. Hib.*), coast below Lady's Island, etc. (Hart).

Viola hirta, Linn.—Below Clohamon, by the Slaney (Hart).

V. canina, Linn. (Fries).—Plentiful at both Crossfarnogue Point (Hart) and Rosslare (G. E. H. B. H.).

V. curtisii, Forst.—Common on sandhills of the coast.

Polygala depressa, Wend.—Frequent in heathy places about Alderton (Miss Glascott).

Malva moschata, Linn.—Frequent throughout the county.

Hypericum androsæmum, Linn.—Frequent.

H. dubium, Leers.—Frequent in north Wexford, *H. perforatum*, Linn., is less so.

H. elodes, Linn.—Frequent in bogs towards the mountains, extending to the coast, and reaching the Saltee Islands (Hart).

Geranium columbinum, Linn.—Many localities throughout the county.

Erodium moschatum, Sm.—Several localities on both east and south coast.

E. maritimum, Sm.—Frequent all round the coast, reaching a maximum in this county, and extending to both the Saltee Islands (Hart); also the Large Keeragh Island (G. E. H. B. H.).

* **Linum angustifolium**, (Huds).—Many stations throughout the county.

Ulex gallii, Planch.—Abundant on coast (Hart); the prevailing furze of the mountains, and on high and wild ground in many parts of the county.

Trifolium fragiferum, Linn.—Several stations near western extremity of south coast.

Lotus corniculatus, Linn., var. **tenuis**.—Alderton (Miss Glascott).

Ornithopus perpusillus, Linn.—Ballyconigar (*vide Cyb. Hib.*); this and Howth are the only Irish localities.

Rosa tomentosa, Sm.—Common throughout the north-west or mountain district.

Lepigonum rubrum, Fries.—At Ballyconigar, and inland on Vinegar Hill (*Cyb. Hib.*). In the latter site, at least, this little annual continues to flourish (C. B. M.).

Cotyledon umbilicus, Linn.—Rather common.

Crithmum maritimum, Linn.—Frequent on the coast. Reaches both Saltées (Hart) and the Hook (G. E. H. B. H.).

† **Pastinaca sativa**, Linn.—Plentiful in many spots round the coast, and considered by Mr. Hart to have the appearance of a native on the Rosslare Sandhills.

- Anthriscus vulgaris**, Pers.—Lady's Island Lake (Hart), Rosslare, and some intermediate localities to Arthurstown (G. E. H. B.-H).
Rubia peregrina, Linn.—Fethard (Hart), Arthurstown (Miss Glascott), Nook, and Duncannon (G. E. H. B.-H.).
Dipsacus sylvestris, Linn.—Frequent in many localities, chiefly near south coast.
Inula crithmoides, Linn.—Greater Saltee Island, and plentifully at the extreme point of Hook Head (Hart).
†I. helenium, Linn.—At Ballyconigar (*Cyb. Hib.*).
Anthemis nobilis, Linn.—Of frequent occurrence, apparently throughout the county.
Diotis maritima, Cass.—At Carnsore Point (*Cyb. Hib.*); coast below Lady's Island Lake (Hart).
Filago minima, Fr.—Very plentiful at Rosslare (Hart); has several stations elsewhere.
Carlina vulgaris, Linn.—Localities occur round the whole coast.
Carduus pratensis, Huds.—Has several isolated localities along feeders of the River Boro.
Thrinacia hirta, DC.—Common, both inland and on the coast. (*Apargia hispida* is rare, and in some of its stations certainly not indigenous.

(TO BE CONCLUDED).

THE WEEVILS OF SOUTH LOUTH.

BY H. K. GORE CUTHBERT.

IN the month of August last year, having to spend part of my summer holidays in south Co. Louth, I took the opportunity to collect and study some of the weevils occurring there. The time of the year (one of the worst for beetles), and the time at my command, made it impossible to compile anything like a complete list of the weevils likely to be found in that district. The exceedingly cold and wet weather was a further drawback, very unpleasant certainly, but not to be appealed against. My researches in Louth therefore, cannot add much to the general stock of knowledge of these insects, but the highly interesting nature of this section of the Coleoptera makes me desirous to investigate it as fully as possible. Unfortunately, coleopterists in Ireland are very few, and a general comparison of local lists, at least at present, is out of the question. This is especially to be regretted in the case of the rhynchophorous genera, comparatively few species of which can be considered generally distributed, whilst very many are locally common. The study of the distribution and habits of weevils is a matter of real importance from the very destructive ravages of certain species. The worst of all, perhaps, are the members of the genus *Calandra*, which attack stored grain, and seem to be found in all climates and countries. Others, particularly the commoner species of *Apion*, *Sitones*, *Otiorrhynchus*, *Hypera*, and the different *Scolytidae*, attack, and at times are exceedingly injurious to, various

crops and trees. The *Scolytidae*, however, like other wood-boring beetles, are rather scarce in Ireland, a thinly-wooded country.

The portion of County Louth where I collected has little diversity of surface, such hills as there are being of trifling elevation. Between the Boyne estuary and Clogher Head, for about four miles, there is a velvet strand, bounded by a broad strip of sand-hills and rabbit warrens. This coast line is only broken by one stream, the Newtown brook, abounding in some parts with trout, but much obstructed by sedge. There is not much plantation, except in detached portions, beech, poplar, ash, and fir being the principal trees. The general absence of hills renders the landscape, on the whole, tame and unpicturesque; but from Clogher Head or its neighbourhood, on a clear day, one may catch some fine views of the Carlingford and Mourne Mountains on the north, and occasionally of the Dublin and Wicklow Hills to the south. But a collecting entomologist has little concern with purely æsthetic feelings, however much they may appeal to him at other times. The best ground for entomological work in this region I found to be the sandy warrens already mentioned, and the wooded headlands adjoining. The great profusion of insects here, considering the wet season, was somewhat remarkable. Lepidoptera, of course, were well represented, and a collector of that order might have reaped a rich harvest, but Coleoptera were equally abundant, particularly the geodephagous and phytophagous groups. In that I am dealing with, more than half of my captures from this county were taken on these sandy wastes, and I do not doubt many additional species would have been met with in the earlier summer months. By beating beeches and alders in Newtown and Blackhall woods, I obtained a fair number of *Otiorrhynchus maurus*, generally accounted a local and northern species. The ground colour of every specimen of this beetle I have seen is not "black," as given by Canon Fowler, but very dark brown. *O. atroapterus* was fairly common near the sea, crawling over sandy patches. Here, too, I came upon three examples of *Strophosomus retusus* at roots of *Anthyllis*, and a single *Trachyphloeus scabriculus*. In the fox-cover at Newtown I took a couple of *Otiorrhynchus scabrosus* and of *O. rugifrons*, the former in moss, and the latter under stones, near the margin of a small pool. I got a small series of *O. ligneus* in the plantations at Blackhall. The common *O. picipes* and *O. sulcatus* were often met with, the first on the trees and bushes everywhere, and the second in moss under hedgerows. The season was rather late for the *Phyllobiina*, and only a few worn specimens of *P. viridiæris* occurred. About the middle of the month a day's sweeping of the brambles, furze, and grasses of Castlecoo gave me a fairly good variety, though not a great number of specimens. This hill (346 feet), is one of the few elevations

in South Louth. The others are Tullyesker (616 feet), about six miles from the coast, and Clogher Head (209 feet), the extreme eastern point. On the north-west side of Castlecoo there is a wide stretch of barren boggy moor—dreary to the eye, and unproductive in two senses—agriculturally and entomologically. I could get almost no beetles here except *Anchomeni*, and they were abundant enough. I took some good weevils on Castlecoo, notably a fine *Rynchites æneovirens*, swept from bramble, a couple of *Brachysomus echinatus*, several *Liosomus ovatulus* from *Ranunculacæ*, a series of *Strophosomus coryli*, two or three *Sciaphilus muricatus*, and several *Barypeithes brunnipes*. *R. æneovirens* I had previously taken (a single insect only), in County Dublin. The latter example is smaller than that from Louth, and has a very distinctly bluish tint. Possibly it should be referred to the variety *fragariæ*. Nine species of *Apion* occurred. All these, with one exception, I had taken in Co. Dublin. The exception is *A. miniatum*, which abounds on plantains in the sandy commons. This is a difficult genus to work out correctly, and I am not sure that I have properly named all my specimens. Sweeping *Genista tinctoria*, *Erodium cicutarium*, etc., and shaking rubbish near the shore yielded me several *Sitones*—*S. griseus*, *S. crinitus*, *S. tibialis*, *S. hispidulus*, and *S. puncticollis*. *S. hispidulus* seems less maritime in its habitat than the others, occurring most abundantly at roots of grass in inland pastures. *S. lineatus* was, as usual, everywhere. *Barynotus obscurus* and *B. mœrens* I took rather commonly in cultivated ground; the latter, though usually reckoned the rarer British species, being much commoner than the former. It seems to have a fancy for mangel-wurzel, the beetle being often turned up under sods in mangold and turnip fields. *Hypera punctata*, another insect usually found at roots of trefoil and wild strawberry, seems to have a liking for the turnip. I found two of its larvæ on the under side of a turnip leaf in a plant that was running to seed. Several other members of this genus occurred, notably *H. rumicis*, *H. trilineata*, *H. variabilis*, *H. murina*, *H. polygoni*, and inevitably *H. nigrirostris*. *H. murina* I have named on a single specimen only, and I am inclined to consider my insect (and the specific type generally), merely an extreme variety of *H. variabilis*. The distinction between these species seems, at most, to be one of size only. *Mecinus pyrauster*, a beetle fairly common in Co. Dublin, I took abundantly on Tullyesker; and *Tychius picirostris* (*micotrogus*. Schön.) once near the shore, together with a single specimen of *Cnecorrhinus geminatus*. This latter (a male) is much smaller than my Wicklow specimens of the same sex, is much lighter in colour, and has a very feeble thoracic puncturation. I hope to explore the locality again for further examples; it would be interesting to find whether these differences are not really accidental. *Orchestes fagi* was the only member of its genus I

met with. Sweeping, shaking rubbish and moss, and beating bushes at Cartown, gave me a couple of *Grypidius equiseti* and several *Ceuthorrhynchidius troglodytes* and *C. quercicola*, *Cæliodes ruber* and *C. quadrimaculatus*, also *Rhinoncus castor* and *R. perpendicularis*. *Ceuthorrhynchus assimilis*, *C. erysimi*, and var. *chloropterus*, *C. contractus*, and several other *Ceuthorrhynchi* were captured on the rabbit burrow and commons near Clogher. The distribution of this genus seems curiously local in the district, for I came across none outside the narrow stretch mentioned. Very probably this was merely an accidental circumstance, but the same remark applies to *Mesites tardyi*, a peculiarly isolated and interesting insect. I found it in great numbers under bark of beech, willow, and poplar, on the bank of the stream near the village of Termonfeckin. This was the only spot where it turned up, though I explored various plantations within a radius of several miles. Another notable peculiarity of this beetle is its great variability in size, some of my specimens not much exceeding the dimensions of a large *Calandra granaria*, whilst others are more than half an inch long. The elytra, too, in most cases are chestnut brown, but sometimes are quite black, and sometimes black with lighter margins. The *Scolytidae*, in spite of many researches, only yielded a single species, *Hylastes opacus*, under the bark of a decayed willow. This is another insect variable in colour, showing all shades of tint, from light red to deep black.

My list of weevils from south Louth includes altogether sixty-four species, in twenty-three genera. It is necessarily very incomplete for the reasons given above, and I have no doubt could be easily doubled. The collecting of these beetles presents no special difficulties. Some of the rare and less evident kinds are rather hard to hit upon, such as those ordinarily found at roots of grasses and low plants. Vigorous sweeping will usually secure most of the others, but the *Ceuthorrhynchi* and allied genera at the least alarm, gather their legs and rostrum underneath the body and drop off their food plants, when it is very hard to trace them. Promptness in using the sweeping-net, so as not to give the beetles time to escape, is all that is required. *Erirhinus*, *Grypidius*, and some others, I have commonly found under stones in damp places, but the habitat of a particular species once known, if the insect exist in the district at all and the season be not too far advanced, a practised entomologist can hardly fail to discover it.

NOTICE.

A series of papers on "The Earthworms of Ireland," will be commenced in the January number of the *Irish Naturalist*, by REV. HILDERIC FRIEND, F.L.S., of Idle, Bradford, Yorkshire.

MR. FRIEND will be grateful for worms from all parts of the country. They should be sent alive in damp earth or moss, in metal boxes. Packages should be marked "Natural History Specimens."

QUARTZITES AND QUARTZ-ROCKS.

BY G. H. KINAHAN, M.R.I.A.

PART I.—QUARTZ-ROCK.

THERE are quartz-rocks, quartzites and quartzites; this obscure statement being due to the present entanglement in the use of the terms. The knowledge recently acquired by the researches of the American geologists, both of the States and the Dominion, demonstrates our ignorance of quartzites, and the importance of their being properly classified. But before entering into this subject, quartz-rock only will be treated of in the first part of the paper, especially the Irish quartz-rocks.

There are now two geologists¹ who would annihilate quartz-rock from the list of Irish rocks; but it seems to me that they have published their views most unadvisably, as they acknowledge that their whole experience in the Irish quartz-rocks is derived from the small Dublin areas, while elsewhere they could get convincing proof against their assertions.

I first examined quartzite and quartz-rock in Howth, Co. Dublin; and quartz-rock in Bray Head about the year 1846; but it was not till the year 1870 that I wrote my first paper on them, after I had studied them in Wexford, Clare, the west of Ireland, etc. In the doctrines put forward by these more recent observers, I do not see any facts that invalidate my original proposition. I find that Prof. Blake, independently, came to very similar conclusions to mine in regard to the origin of the majority of the quartz-rock cakes and intrudes.

Microscopists must not run away on theories in contradistinction to facts. If the dykes and cakes are due to springs, the rock may be more or less fragmentary, let it be the adjunct of a silicious, calcareous, or ferriferous spring. This can be ocularly proved by observing the action of a spring. Usually the welling up is more or less gentle and regular, and under such circumstances the depositions are nearly homogeneous; but at times the welling up is most violent, and according to the ratio of its force, it breaks off greater or less sized fragments of the already deposited accumulation. These, as can be ocularly proved, are whirled round and round in the vortex of the vent, thus being more or less rounded prior to being ejected from the spring to add to the accumulation. In such accumulations, let them be silicious, calcareous, or ferriferous, the inlying particles are of composition identical with that of their

¹ W. J. Sollas, "On the Structure and Origin of Quartzite Rock in the neighbourhood of Dublin," *Sci. Proc. R.D.S.*, n. s., vol. vii., pp. 169-188; G. A. J. Cole, "County Dublin Past and Present," *Irish Nat.*, vol. i., pp. 10-12.

matrix; but necessarily in consequence of their origin and mode of deposition, their structural lines will not coincide with those of their matrix. Therefore, any microscopist who may form a theory solely on their appearance is altogether at sea. As far as my experience goes, such inliers in quartz-rock are so similar to the matrix, that in the majority of cases ordinary field workers would not detect them, the inliers being quartz-rock, and the matrix quartz-rock. I know, however, exceptions where the inliers are much more felsitic, or ferri-ferous, or calcareous than the matrix; or the inlier may be a perfectly different class of quartz-rock to the matrix, thus giving to the rock a fine conglomeritic appearance. This I especially noted in a mass of quartz-rock in the Co. Donegal, to the west of Mulroy Bay.

Such fragments, I would suspect, came up from below, as fragments will come up in springs when in violent action. Thus a strong spring in a limestone tract may, when working violently, bring up from a deep source silicious sand.

These fragmentary quartz-rocks, if only examined microscopically, may be pronounced to be clear proofs of the original sedimentary origin of the rock; but if the mass of the rock is examined one has to come to a different conclusion.

Fragmentary portions of undoubted intrusive rocks are not uncommon, as has been pointed out over and over again in previous writings, and such rocks are much more complicated than the brecciated quartz-rocks, as such intrudes usually contain distinctly foreign inliers, while the quartz-rock rarely does; although in places, as at the Eagle's Rock Hacketstown, Co. Carlow, the intrudes of quartz-rock contain inliers of granite. As to "undoubted bedded lines" in the quartz-rock of the Sugar Loaves, Co. Wicklow, I do not believe that such is their origin. The lines do exist, but they are not due to original bedding, as will be proved if we go further afield.

Similar lines, very generally, are ordinary characteristics of quartz-rock. Numerous places could be mentioned all over Ireland, but the following need only be specially referred to. The intrude of quartz-rocks ("white rocks,") in the granite a little north of Tinnahely, Co. Wicklow, has in it similar lines; as also the intrude, a little further north, called the Eagle's Rock, Hacketstown, Co. Carlow; similar lines also occur to the south-west of the Co. Wexford, in the dykes that extend from the Oldhamian into the Ordovician. In the museum of Trinity College there ought to be a specimen of a similarly lined quartz-rock that was procured from an intrude at the hill summit to the south-west of Oughterard, Co. Galway. Examples could be multiplied so as to fill the whole of this number of the Magazine. It is, therefore, only necessary to say that such bedding-like lines are common in intrudes of quartz-rock, but their exact origin has still to be determined. In the quartz-rock which is the basal bed of the Carboniferous

in places in the Co. Clare, such lines are evidently perpendicular to the true bedding, as they are also in some of the "Pipe-Quartzites" of Sutherland, Scotland.

The origin of quartz-rock is far from proved. So much the better, as it is a field for young geologists to work at. But I, as an old hand, would advise them to look before they leap. In places such as Howth; Carrick mountain, Co. Wicklow; Forth mountain, Co. Wexford, *when casually examined*, it seems to be bedded with the associated rocks. But in other places, such as the Bannock district, Co. Wexford, etc., it is undoubtedly intrusive; and nearly invariably it has these bedding-like planes often perpendicular to the walls of the intrude, but sometimes parallel, as is the case in the dykes of blackish quartz-rock, the adjuncts of the granites on the north-east flanks of mount Leinster, Co. Wicklow.

Quartz-rock, as a rule, is water-bearing, while quartzite is not; quartz-rock may occur as an independent rock, as intrudes or dykes in sedimentary rocks, or in granites, or as adjuncts of granite veins; but when there are extensive tracts of quartzite, quartz-rocks nearly invariably are found associated with them. These, where they occur, vary the otherwise monotonous tract, as along them and associated with them are springs, and consequently spots and tracts of vegetation; this subject, however, will be more particularly referred to in the second part of this paper.

As my convictions as to the origin and advent of quartz-rock have long since been published, it is unnecessary to repeat them.¹

Quartzite is perhaps the greatest puzzle of geology. As far as my experience goes, there are no general rules by which to determine the geological age of any isolated tract; and the most experienced worker may be stumbling about for months, or even years, before he discovers that all his conclusions are incorrect.

The mapping of quartzite and quartz-rock in Ireland was originally mixed up. Griffith, indeed, seems to have had an idea that there was a difference between them, and also in the ages of the different tracts of quartzite, as he has coloured and lettered them differently; but as his map is necessarily only a general one, nothing definite can be learned from it. Wyley, on his field-maps of Howth, Wicklow, and Wexford, has mapped quartzite as distinct from quartz-rock, but in De la Beche and Oldham's published maps his classification is ignored.

Subsequently John Kelly insisted that these rocks were of distinct origin, the quartz-rock being intrusive or protrusive but he was laughed at, although his paper was published in the *Journal of the Dublin Geological Society* (vol. v., 1853,

¹ "Geology of Ireland," pp. 14 and 196.

pp. 240 and 255). An amusing scene took place at the discussion. An eminent chemist stated: "It is a well-known fact to chemists that quartz cannot be melted," when old Kelly stood up and said: "I know a Chemist who can melt quartz." I guess he was right.

When working in the west of Co. Galway, I wanted to map these rocks separately, but Jukes objected. Subsequently, however, Jukes examined for himself, and in his one-inch map of Dublin, Wicklow, and Wexford, the quartzite and quartz-rock are distinctly lettered and coloured.

In spite of what had been previously learned, when I read a paper showing that quartz-rock must be either intruded or protruded, there was such opposition to its publication by the Irish scientific societies, that I withdrew it, and published it in the *Proceedings of the Manchester Geological Society*. Now we seem to have gone back to the "Dark Ages" again, as in the maps and memoir of north-west Ireland, recently published, these rocks are higgledy-piggledy.

Quartzite may be either metamorphosed (sheared) quartz-rock, or metamorphosed sedimentary silicious accumulations. It does not, however, necessarily follow that all quartz-rock, or sedimentary silicious rocks, when metamorphosed (sheared) should be changed into quartzite; because, if the constituents are suitable, such changes may produce silicious micalyte, gneiss, or even a granitoid rock. The quartz-rock of the Carrick mountain-range, Co. Wicklow, when traced westward into the metamorphic area, becomes a silicious-gneissoid or granitoid rock, and although called quartz-rock on Wyley's working maps, on Jukes' published maps it appears as granite. In the Bennabeola range quartzites, Co. Galway, there are dykes of quartz-rock now represented by fine granytoid rocks or granular felsytes, while in the same range some of the original sandstones are now micalytes; also, in Co. Donegal, there were obliquely laminated sandstones, that now in places are represented by obliquely laminated massive gneiss.

These sandstones of Co. Donegal are very interesting and instructive. They occur as a middle zone in the Upper Terrane. To the south-westward they are very much altered. In the neighbourhood of Knockybrin (Letterkenny) they are much sheared. Further eastward, from Rathmelton to Lough Swilly, they are massive rocks that can be roughly tooled, while if followed still further eastward across Inishowen, they are found to be a kind, compact rock eminently suitable for the finest tool-work. Numerous other localities could be referred to, if necessary, but those given ought to illustrate the changes that take place owing to metamorphism.

A tract or a massive dyke of quartz-rocks that has been invaded by upthrusting and shearing, and partly changed into quartzite is most unsatisfactory to work out and explain, as irregular bits and tracts have not been affected by the shearing

force so that now in many places between the changed and unchanged rocks, there are no defined boundaries, one irregularly merging into the other. In Ireland the older quartzites after sedimentary rocks (originally Algonkians or Pre-Cambrians, some probably being Cambrians or even Post-Cambrians) generally appear to occur in more or less well defined tracts. This, however, is more apparent than real, because if minutely worked out, they in places are found to be interlaced with micalyte or other foreign schists. Upthrusting has in many places made distinct longitudinal boundaries or even transverse boundaries, as the floors of the faults are of the harder rocks; not however necessarily one continued bed, as the more friable beds, or portions of beds, were ground away, and the fault line may creep across the beds, or along a line of weakness, thus crossing them more or less transversely.

(TO BE CONCLUDED.)

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations comprise a Goat from J. Reilly, Esq.; eight Dormice, four Hamsters, five Edible Frogs, two lizards, and four toads from P. Mahony, Esq.; a Grouse from W. Darley, Esq.; Rabbits from Master Maloney; six Fantail Pigeons from G. H. Stubbs, Esq.; a monkey from Mrs. Cavanagh; two Rabbits from Messrs. G. and J. Armstrong; a monkey from W. C. Beever, Esq.; and a pair of Cormorants from an unknown donor. A number of sea-fish for the aquarium have been purchased.

9,300 persons visited the gardens in September.

BELFAST NATURALISTS' FIELD CLUB.

SEPTEMBER 17th.—Last excursion of the season to Ardglass and Kilrough. A party of ninety travelled by 10.30 train over the new line to Ardglass. In spite of the lateness of the season the botanists did good work, Mr. Praeger being especially fortunate, securing *Papaver hybridum* and *Festuca rigida*, both of which are extremely rare in the north east. Other species observed were *Ananthe lachenalii*, *Ononis arvensis*, *Papaver rhæas*, *Lamium intermedium*, *L. amplexicaule*, *Ballota alba*, *Sinapis alba*, *Sclerorchloa loliacea*. Uptilted Silurian grits, beautifully ice-worn, were inspected on the shore, where also a good section of Glacial and Post-glacial deposits was seen. Tea was provided at Ardglass, and the party returned to Belfast by the 6.35 train.

ARMAGH NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

OCTOBER 5TH. Annual meeting of the society. The President (Rev. W. F. Johnson, M.A., F.E.S.) occupied the chair, and there was a large attendance. The annual report and statement of accounts, which showed the society to be in a very satisfactory condition, were submitted and adopted, and the present office-bearers were re-elected.

DUBLIN NATURALISTS' FIELD CLUB.

OCTOBER 8TH. The closing excursion of the season to Glendhu and Tibbradden was attended by twenty-nine members, who drove from Terenure to the wood at Glendhu. Here the party separated. Rev. M. H. Close and Prof. Cole led those interested in geology, first to a gravel-pit showing a good section of the Middle Glacial Drift, with numerous limestone pebbles, though a mile on the granite outcrop, and then to the summit of Tibbradden. From here the general structure of the country was seen and explained, and the position of the high-level shell-gravels pointed out. Some of the party came down to Glendhu again, but the more adventurous proceeded along the ridge to Two Rock and Three Rock Mountains, the jointed and weathered granite crags on the latter receiving attention, and finally descended to Dundrum.

In Glendhu the collectors of plants and insects did some good work. Among the insects, the handsome dipterous *Bibio pomona*, Fab., was a noteworthy capture. With other, commoner spiders, *Drapetisca socialis*, Sund., occurred in abundance; this species was first taken in Ireland at the September excursion of the club in 1890. Mr. D. McArdle collected liverworts, and secured the following species:—*Frullania dilatata*, Linn.; *Radula complanata*, Linn.; *Lepidozia reptans*, Linn.; *Cephalozia bicuspidata*, Linn.; *C. lammersiana*, Huben.; *Lophocolea bidentata*, Linn.; *Kantia trichomanes*, Dicks; *Saccogyna viticulosa*, Mich.; *Scapania nemorosa*, Dumort; *Diplophyllum albicans*, Linn.; *Plagiochila asplenoides*, Linn.; *Fungermannia ventricosa*, Dicks; and many curious forms of *Nardia emarginata*, Ehrh.

The October excursion is generally regarded as a "fungus foray." The President, Dr. McWeeney, unfortunately, was the only mycologist present, but the number of species found by him was very large, and Glendhu Wood vindicated on this occasion its reputation as a good collecting-ground for the larger fungi. The moss-covered soil swarmed with agarics, but only a relatively small proportion is included in the following list on account of the difficulty of certainly identifying the specimens. At least half-a-dozen small species of *Cortinarius* (*Dermocybe*), and *C. (Hygrocybe)* are omitted for this reason. The following species were identified:—*Agaricus (Clitocybe) nebularis*, Batsch; *A. (Amanita) muscarius*; *A. (Tricholoma) terreus*, Schaeff.; *A. (Mycena) galopus*, Pers.; *A. (Lepiota) granulatus* Scop, var. close to *broadwoodiae*; *A. (Galeria) nimophilus* Lasch (on *Pellia*); *A. (Pholiota) squarrosus*; *A. (Hypholoma) sublateralis*, Schaeff.; *A. (Stropharia) aeruginosus*, Curt.; *A. (Stropharia) semiglobatus*; *Cortinarius (Dermocybe) multus*, Fr.; *C. (Hygrocybe) near uraceus*; *Paxillus involutus*, Fr.; *Russula nigricans*, Fr.; *R. rubra*, Fr.; *R. emetica*, Fr.; *R. ochroleuca*, Fr.; *Lactarius rufus*, Fr.; *Boletus edulis* (large specimens seven and a-half inches across pileus, and seven inches round thickest part of stipes); *Clavaria inaequalis*; "Flo. Dan."; *Calocera viscosa*, Fr.; *Hydnum repandum*, Linn; *Helvella lacunosa*, Afz.; *Chlorosplenium aeruginosum*, "Flo. Dan.," with fine cups; *Helotium conigenum*, Pers., and *Peziza vesiculosa*, found by Mr. McArdle, and identified by Mr. Phillips, of Shrewsbury, comprised the Discomycetes. The imperfect stage of *Hymenys* sp. known as *Sepedonium chrysospermum*, was found plentifully on dead *Boleti*. The most remarkable finds, however, were amongst the lower orders of Fungi. A brown hyphomycete with coiled spores close to *Helicoma*, but not identical with *H. mülleri*, Ca., the only species given as British by Cooke; and a still more curious species, *Ptychogaster albus*, Ca., for some time proved quite a puzzle.

The only Uredineæ found were a *Puccinia* on a plant of *Viola canina*, another on the Spear-thistle, and *Phragmidium violaceum* with uredo-spores, and mature and immature telento-spores on one and the same bramble-leaf.

The commonest agaric was a yellow *Russula* close to if not identical with *R. sardonica* and very acrid. It occurred in troops throughout the wood. The number of species in the above list might readily have been trebled had a division of labour been practicable in the work of collection and identification.

NOTES.

BOTANY.

FERNS.

Hymenophyllum tunbridgense IN CO. WEXFORD. Bearing on the occurrence of this fern in Co. Wexford (*I. N.*, p. 103), I may state that I found a small patch on the western side of Taragh Hill, near Courtown, on the 10th August last. *Asplenium marinum* was very luxuriant on the sandstone cliffs of the adjoining shore.—H. G. Cuthbert, Blackrock, Co. Dublin.

PHANEROGAMS.

WHITE CENTAURY (*Erythraea centaureum*). White-flowered specimens of this plant, as noticed in last issue of *Irish Naturalist* (p. 144), are certainly not common, but we obtained several examples on the excursion of the Belfast Nat. Field Club to Ardglass on September 17th last, and I have also seen it at Castlerock, Co. Derry. Many other wild flowers occasionally occur with white blossoms.—R. Lloyd Praeger.

Stachys betonica IN CO. DONEGAL. In the *Journal of Botany* for September, Mr. H. C. Hart records this plant from Lough Fern near Milford, where it was discovered by Mrs. Leebody. The same energetic lady botanist has recently found *Polygonum bistorta* in the Frin Valley, and *Galium mollugo* at Eglinton, Co. Derry.

Ajuga pyramidalis IN THE ARAN ISLANDS. In the *Journal of Botany* for October, Mr. N. Colgan records his rediscovery of this rare plant in the Aran Islands, where it has not been found since Dr. Moore discovered it forty years ago, though sought for by various botanists. We are glad to observe also that Mr. Colgan states that *Astragalus hypoglottis* is not so very rare on the Aran Islands as recently described by Messrs. Nowers and Wells (*Journ. Bot.*, 1892, p. 180).

ZOOLOGY.

PYCNOGONIDA.

PYCNOGONIDA FROM KILLALA BAY. In the *Irish Nat.* for May (p. 42), I recorded a supposed new species of *Nymphon*, received from Miss Warren. Prof. D'Arcy Thompson, when in Dublin, kindly examined the specimen, and suggested to me that it was *N. gallicum*, Hoek. After careful comparison with Hoek's figures, I have no doubt that this identification is correct. Another example of this species was taken some years ago on the shore at Roundstone, Connemara, by Mr. A. G. More, and is now in the Science and Art Museum. Hoek described the species from specimens taken near Roscoff, on the north-west coast of France. I have lately received from Miss Warren *Phoxichilus spinosus* and *Phoxichilidium femoratum*, taken in Killala Bay; these are the pycnogons recorded by Mr. R. Warren in the *Zoologist* for October as "Nymphons."—G. H. Carpenter.

INSECTS.

COLEOPTERA FROM COURTTOWN, CO. WEXFORD. The following (with notes) is a list of beetles collected at Courtown Harbour and district, during a short holiday last August, omitting a large number of species which are more or less abundant everywhere:—*Cychrus rostratus*, *Carabus catenulatus*, *Nebria complanata*, *Harpalus puncticollis*, *Bradycellus distinctus*, *Amara fulva*, *A. consularis*, *Calathus mollis*, *Anchomenus oblongus*, *Bembidium*

affine, *B. femoratum*, *Deronectes xii-pustulatus*, *Agabus guttatus*, *Ilybius ater*, *Bolobobius lunulatus*, *B. pygmaeus*, *Stenus binotatus*, *Astilbus canaliculatus*, *Philonthus ebeninus*, *Cafius xantholoma*, *Ocypus ater*, *Melolontha hippocastani*, *Serica brunnea*, *Aegialia arenaria*, *Chrysomela fastuosa*, *C. polita*, *C. hyperici*, *C. staphylea*, *Gastrophysa raphani*, *Prasocis juncei*, *Donacia bidens*, *Adimonia tanacetii*, *Lema cyanella*, *Helodes lividus*, *Haltica pusilla*, *H. mercurialis*, *Psylliodes chrysocephala*, and var. *nucca*, *P. chalconera*, *Cassida equestris*, *Adalia m-nigrum*, *Olibrus ceneus*, *Rhizobius litura*, *Otiorrhynchus atroapterus*, *O. ligneus*, *Cneorrhinus geminatus*, *Sitones suturalis*, *Hypera rumeis*, *Nanophyes lythri*, *Rhamphus flavicornis*, *Mesites tardyi*, *Helops striatus*, *Lagria hirta*, *Rhinosimus planirostris*, *Heliopathes gibbus*.

Nebria complanata. This species was first taken at Courtown by Mr. W. F. de V. Kane. It occurs in some numbers on rocky ground at River-chapel, just above high-water mark; also in and about the bathing-boxes, to the discomfort of some of the bathers, judging by certain complaints of "white clocks." The insect in general is much lighter coloured living than dead, and the extent of the elytral black markings does not vary much in any of the specimens I captured.

Bradycellus distinctus. One example on the shore at Ballyman. This seems to be scarce or very local in Ireland. I have taken it in Co. Louth, and it has been lately recorded from Stormount, Co. Down.

Melolontha hippocastani. One specimen on the shore, rather worn, but the black border of the elytra, defining the species, is well marked.

Chrysomela fastuosa. Once, when sweeping docks in Lord Courtown's demesne.

Donacia bidens. One specimen on the shore; (known as *D. versicolora* in Sharp's Catalogue, 1883).

Adalia m-nigrum. On larches, very abundant. These specimens are all darker than those from Co. Dublin.

Otiorrhynchus atroapterus. Common on the sandhills, and very variable in size. I found this beetle twice feeding upon dead Diptera, though usually considered herbivorous.

Mesites tardyi. In great abundance under dead bark of oak, near the shore. These specimens do not vary much in size or colour.

Lagria hirta. A single example, a male, captured in a window. The female I have taken frequently in Co. Dublin, but the male seems scarcer. For this and one or two other species, I am indebted to the kindness of M. N. S. Head, a promising young entomologist, from whom more than once I received valuable assistance.—H. Gore Cuthbert, Blackrock, Co. Dublin.

LEPIDOPTERA FROM THE LIMERICK DISTRICT. In May, 1891, at Plassy, some few miles up the Shannon from Limerick, it was my fortune to obtain a pupa of the Hornet Clearwing (*Trochilium crabroniformis*), which emerging the following month, produced the only specimen of the moth then recorded from this district. Going there this year I found the willow from which I had obtained it had been blown down, and as the stem seemed a good investment from an entomological point of view, I determined to secure it. The question of ownership was easily arranged with the occupier of the land on which it had grown, so early in June two sections of the trunk, each about five feet long, were transported with considerable labour from the river-side to my house in this city, where they received careful attention in the way of watering, sheltering from strong sunshine, and close watching. From the 17th to the 28th of the month I was rewarded by the appearance of fourteen perfect insects, eleven being males, and three females. The production of unwelcome visitors as earwigs, woodlice, centipedes, slugs, worms, etc., was immense, at times almost alarming in one's house!

Visiting Cratloe, Co. Clare, on the 6th June, Dingy Skippers (*Nissoniades tages*), were fairly common, and in good condition; Green Hair-Streaks (*Thecla rubi*), scarce, and very much worn, and in one small marshy place Greasy Fritillaries (*Melitaea aurinia*) were abundant, and in such splendid order, as seemingly to have but just emerged. Going to Cratloe again

on the 15th July, a deformed Purple Hair-Streak (*Thecla quercus*) was found by my son under an oak tree in the grass. Keeping a look-out we soon noticed more fortunate individuals flying about the tops of oak trees, but entirely out of our reach. They continued on the wing until August 12th (possibly later), and I obtained a fair number of specimens. About four o'clock in the afternoons they become very active, playing with and chasing their companions in groups of from two to six or eight, and then is the collector's opportunity, as in so doing they frequently come within his reach, and he may, as I frequently did, secure several at one stroke of the net. A light handle, some ten feet long, I found a great help in dealing with this "high-flyer." Silver-washed Fritillaries (*Argynnis paphia*), were very abundant all through the wood, the only variety obtained being a specimen in very good condition, in which the right pair of wings are female, and the left male.—Francis Neale, Limerick.

BUTTERFLIES FROM HOWTH. In August this year I took on the Hill of Howth a fine specimen of the Peacock Butterfly (*Vanessa io*), female. I do not know whether this is a rare occurrence or not; it was so to me at least. At several places on the Hill the Grayling (*Satyrus semele*) was exceedingly abundant. The Painted Lady (*Vanessa cardui*) was also a fairly common insect at several places on the Baldoyle coast, and the Ringlet (*Epinephile hyperanthus*) was of frequent occurrence everywhere.—Wm. Starkey, Jr., Rathmines, Dublin.

[*V. io* is not common in Co. Dublin. We saw a specimen lately taken at Kingstown by Mr. R. E. Matheson.—Eds.]

***Vanessa cardui* NEAR BELFAST.** On the June excursion of the Belfast Naturalists' Field Club at Islandmagee I saw several specimens of this beautiful butterfly; some were captured, and found to be very much faded, evidently hybernated specimens. For several weeks after this I kept a good look-out for larvæ, but only succeeded in finding four very small ones in the third week of July, near Helen's Bay station, Co. Down, from which I reared three fine imagos. I think it is about six or seven years since I observed this species, when I took several larvæ in this locality. This observation agrees with the Rev. W. F. Johnson's note in the September number of the *Irish Naturalist*. In the past season I noticed a great scarcity of the larvæ of the Tortoise-shell Butterfly, *V. urticae* but found the Red Admiral, *V. atalanta*, numerous, and reared some fine specimens.—J. Hamilton, Holywood.

BUTTERFLY APPEARANCES.—I regret that I cannot answer Mr. C. B. Moffat's query (*Irish Naturalist*, p. 146) as to the nearest constant habitat to Kilderry, of *Epinephile hyperanthus*. I think, however, I am pretty safe in saying that there is none from which a migration of larvæ could be possible. In 1870 I took one specimen at Glenalla, Co. Donegal, and the same summer I found it not uncommon at Kilcronaghan, Co. Derry. Within the peninsula of Inishowen I have never seen it, except at Kilderry. A good many Red Admirals (*Vanessa atalanta*) were seen in August and September. In the year 1855, and again in 1865, this butterfly literally swarmed at Kilderry; but for the most part it is decidedly rare in this district. The Painted Lady (*Vanessa cardui*) seems to be an insect of a wandering disposition. It is not to be looked for as a frequent visitor at any one spot; but if one be much upon the move, a good many may be seen in any year. I believe this is its character nearly everywhere.—W. E. Hart, Falmore, Carrowmena, Co. Donegal.

MOLLUSCA.

RARE MOLLUSCS FROM CO. SLIGO. I have to record the occurrence of that very rare shell *Montacuta dawsoni*, Jeff., in Killala Bay. Mr. Marshall, of Sevenoaks, Torquay, detected a valve in some shell sand that I sent him from this locality. Valves were dredged in deep water off Donegal Bay, in the "Porcupine" expedition. Another rare shell, *Odostomia nitidissima*, Mont., has been obtained in shell sand from Enniscrone, Co. Sligo.

Some of the readers of the *Irish Naturalist* who take an interest in *Ver-*

tigos, will be pleased to know that there is a small spot in Killanley marsh Co. Sligo, where *V. augustior* is living. I have got numbers at the roots of grass, but only on a favourable day, when the atmosphere is warm and moist, are the little creatures to be found easily; a cold or dry day sends them out of sight somewhere. They are not shy, but soon begin to crawl about the collecting box. I discovered this habitat several years ago, and sent some living specimens to the late Dr. Jeffreys, who wished to make some notes on the animal. I have also found *V. substriata* in the same marsh, but it is much rarer here than *V. augustior*. I may add that I have frequently seen the latter in shell-sand from the sea-shore.—Amy Warren, Moy View, Ballina.

LAND SHELLS FROM CO. DONEGAL. On the occasion of the excursion of the Belfast Naturalists' Field Club to Bundoran and Sligo, in July last, I wandered along the sandy shores of the River Erne, close to its mouth, and was watching the evolutions of a flock of a dozen fine Sheldrake, which were circling round, when my attention was directed to a deposit left by the receding waves at high water-mark, and which, on inspection, was found to consist mainly of innumerable specimens of small land-shells, mixed with sand, scraps of sea-weed, and rabbits' droppings. I brought away a box full of the material for examination, and finding the smaller forms too critical for my limited knowledge, I sent a portion to Dr. R. F. Scharff, who picked out from one and a-half ounces of the stuff, no less than 1050 specimens of land-shells (unbroken ones only counted) representing eighteen different species, several of the more abundant forms being rare or local species in Ireland. The following list, which Dr. Scharff kindly sent me, gives the proportion of the different kinds:—*Pupa muscorum*, 508 specimens; *Helix pulchella*, 166; *Vertigo augustior*, 134; *Clausilia bidentata*, 44; *Cochlicopa lubrica*, 53; *Vertigo pygmaea*, 32; *Carychium minimum*, 25; *Helix hispida*, 23; *Vertigo pusilla*, 15; *Helix acuta*, 14; *Vertigo striata*, 11; *Hyalinia crystallina*, 11; *Helix nemoralis* (juv.), 5; *Helix pygmaea* 3; *Hyalinia fulva*, 3; *Hyalinia cellaria* (juv.), 1; *Vertigo edentula*, 1; *Helix ericetorum* (juv.), 1. Two young *Hydrobia* also occurred, a young *Cardium*, and a young *Pleurotoma*, derived from the marine waters adjoining. As regards the origin of the material, the fact of the shells being discovered in a dead state cast up by the waves, of course precludes a positive statement; but judging by the entire absence of fresh-water shells and plants, twigs, leaves, and other transported matter, which would certainly have been present had the deposit been derived from the upper reaches of the river, or from the extensive sheets of inland water through which it flows, and by the abundance of rabbits' droppings, and the character of the shells themselves, several of which particularly favour dry and sandy places near the sea, there can be no doubt that the material came from the extensive stretch of sand-dunes that fringe both sides of the river-mouth, whence it was washed down by heavy rains. In this opinion Dr. Scharff agrees with me, and I quite expect that all the species mentioned will be found living there by the first conchologist who investigates the neighbourhood.—R. Lloyd Praeger.

BIRDS.

RUDDY SHELDRAKES, (*Tadorna rutila*), IN IRELAND. A flock of five of these birds appeared at Skerries in the latter part of June, of which three were shot, two unfortunately not preserved. Another was shot a week later at Drogheda, probably part of the same flock. I have heard of another shot at the same time at Portarlinton, Queen's County.—E. Williams, Dublin (in *Zoologist* for October).

SEA-BIRDS IN CO. SLIGO. It may interest some of your readers to know that a fine specimen of the rare Pomatorine Skua, *Stercorarius pomatorhinus*, was washed ashore at Eunisrone, Co. Sligo, on Monday, the 3rd October. I found it quite fresh and uninjured when searching for shells, after a storm from the north. The following day my brother got a Fulmar Petrel, *Fulmarus glacialis*, and two young Gannets, *Sula bassana*, on another part of the sandy beach, the same tide had evidently washed them all in.—Amy Warren, Moy View, Ballina.

MAMMALS.

IRISH FOSSIL MAMMALS. As I have it in contemplation to prepare a map showing the distribution of fossil mammal remains in Ireland, I shall feel much obliged to any correspondents who will be so kind as to communicate to me, the names of localities where well authenticated discoveries of such remains have been made, especially those of late years, and of which perhaps only ephemeral notices in the daily press, if any, have hitherto been published.—V. Ball, Science and Art Museum, Dublin.

THE IRISH RAT (*Mus hibernicus*, Thomps.), ON LUNDY ISLAND. With reference to Mr. Charbonnier's note on this subject in the September issue of the *Irish Naturalist*, I should like to call attention to the following, which appeared in the *Field* of April 2nd. last:—"It is always sad to hear of the extinction of any species of mammal or bird in England, and I fear our old English Black Rat is fast disappearing from its last refuge in Lundy Island. Until a few years ago the Black Rat was quite common there, particularly on Rat Island; but lately its old enemy, the so-called Norway Rat, has gradually driven it from pillar to post, until there is great danger that the Black Rat will be entirely exterminated." The writer of the above note has kindly informed me that he possesses a specimen of the English Black Rat (*Mus rattus*), which was captured on Lundy Island. Unfortunately, I have, as yet, been unable to examine it, and it is possible that it may be in reality a specimen of *Mus hibernicus*. It would be interesting if it were found that both black rats occur on Lundy Island. Perhaps Mr. Charbonnier can tell us if this is the case? I should be very much obliged if he would kindly give the dimensions of his specimen, or, better still allow me to examine it.—G. E. H. Barrett-Hamilton, Kilmanock, New Ross, Co. Wexford.

GEOLOGY.

PERFORATIONS IN CARBONIFEROUS LIMESTONE.—I am sure many readers of the *Irish Naturalist* will thank Dr. Scharff for his paper on this subject. I believe all who will carefully examine these curious perforations, will conclude that they were formed by some animated agent, presumably by either the marine *Pholas crispata*, or the land *Helix aspersa*. The latter Dr. Scharff believes to be the real constructor. Yet I think the former has got only scant justice. Of course, the "fresh condition" of the perforations seem to be conclusive against referring their construction to a distant geological era. But, I think, it can be shown that this "freshness" is only apparent. From the situation of the rock (*I. N.* for June) on the side of a steep brae, surrounded by a thick layer of stiff Boulder clay, containing erratics of whin and sandstone, out of which this perforated limestone rock juts for only a few feet, or a few inches, I think it can be scarcely be doubted that at a comparatively recent date, this rock, with all its furrows and holes, was covered up by this Boulder clay, which has now been washed away into the low land by the rain and storms of many years. If this be admitted, there is little difficulty in going a step further, and ascribing the tunneling to *Pholades* before they were overtaken in their labours by the great climatic change which took place in this country during the Glacial period. Of course, when this rock was covered by the drift clay, it was perfectly preserved. It is probable, then, that this tunneling is not the work of any mollusc now living either on land, or in the sea. At the same time, it must be admitted that the rock may have been attacked by a land mollusc after being denuded of its covering of earth, but I never saw in this locality a snail capable of making an impression on a stone.—O. Smith, Nobber, Co. Meath.

There is no doubt, after the investigations referred to in my paper, that *Helix aspersa* does bore stones; and it is a common snail in most parts of Ireland. One of the most striking points which I hardly mentioned against the theory of the holes having been produced by *Pholas* is that the perforations commence as broad, shallow pits, while small holes, such as are produced by young *Pholades*, are quite wanting.—R. F. Scharff, Dublin.

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NOTES ON THE BIRDS OF LOUGH SWILLY

BY PROFESSOR J. R. LEEBODY, M.A., D.SC.

VERY full information regarding the birds of the Co. Donegal may be found in a series of articles by Mr. H. C. Hart, in the *Zoologist* for August, September, October, November, and December, 1891. The present paper refers to the birds of a single district, but a very favourable district for studying the habits of our winter migrants. The facts recorded are all the result of personal observation.

The birds of a district may, for purposes of study, be conveniently classified into permanent residents, summer visitors, and winter visitors. The permanent residents of Lough Swilly are those ordinarily found round any estuary of our coasts, with the addition of the following, which are not so common:—The Peregrine, the Raven, the Kingfisher, the Shelldrake, and the Shoveller. The Peregrine breeds each year in at least two places on the lough—the Bin and Knockalla. The Raven breeds at Dunaff Head and the Bin. In 1890 and 1891, the Kingfisher bred at Inch. One or two pairs of Shovelers breed regularly at Inch, and at least one pair of Sheldrake.

The summer visitors which frequent Lough Swilly are not very numerous. The Guillemots, Razorbills, Puffins, and Gulls, which breed in such countless thousands at Horn Head, visit the lough in pursuit of food; but, except at Dunaff, do not, to any extent, use the cliffs bounding its shores as breeding-places. So far as I have been able to observe, sea-fowl rarely select cliffs as a breeding-place, unless these are in proximity to a strong tidal run in the open sea. The reason for this seems obvious: the parent birds mainly rely on herring fry as a food supply for their nestlings, and although herring fry are distributed pretty generally round our coasts in June and July, they are most plentiful in any locality where there is a strong open sea and tidal current. Horn Head and Rathlin are the places which best fulfil this condition on the north of Ireland coast.

The main interest of the birds of Lough Swilly centres in the winter visitors. The lough bifurcates into various inlets, which are from fifteen to twenty miles from the open sea. These abound in shallows, furnishing the food and shelter so attractive to wild-fowl in wintry weather. One of these inlets is a special wild-fowl resort. The island of Inch is situated about fifteen miles from the mouth of the lough. On its west side it is bounded by rapidly-deepening water. On its other sides the water was very shallow. Some forty years ago two embankments were constructed connecting Inch with the mainland. The north and west sides of the island are now surrounded by the sea; the south and east sides are bounded by shallow water cut off by the embankments. The portion of water so cut off, I speak of in this paper as "the inland water." It is really a sheltered shallow lake of brackish water, several hundred acres in extent, and abounding with every sort of food in which wild-fowl delight. In severe weather flight-shooting can be successfully practised between the inland water and the sea, and it was while engaged in flight-shooting that most of my observations were made.

Anser cinereus, Meyer.—GREY LAG-GOOSE.—This goose is rare. In the winter 1888-89 a flock of nine or ten geese stayed on the Inch water for some weeks. From a scrutiny with a field glass, I judged them to be Grey Lags, and one shot by a local fowler weighed 11 lbs.

A. albifrons, Scop.—WHITE-FRONTED GOOSE.—From thirty to forty of these geese stay each winter on the Inch water. They arrive in November, and do not leave till May. I noticed them as late as May 19th in 1891. This year they left about May 1st; but I noticed a single bird near Buncrana on May 25th.

Bernicla leucopsis, Bechst.—BERNICLE GOOSE.—Rather rare in Lough Swilly. One was shot during the past winter (1891-92) by a Derry gentleman, who has had it preserved.

B. brenta, Pall.—BRENT GOOSE.—Extremely plentiful in Lough Swilly. Flocks which cover several acres of water may frequently be seen between Inch and the mouth of the river Lennan. They arrive about the end of September, and leave about the beginning of March. They seldom visit the inland water, and very few of them fall to the gun of the flight-shooter.

Cygnus musicus, Bechst.—WILD SWAN or WHOOPER.—Five swans visited the inland water in the winter of 1889, which I judged, from their size, to be Whoopers. One of them, shot by a local fowler, weighed over 16 lbs.

C. bewicki, Yarrell.—BEWICK'S SWAN.—This swan visits the Inch water every season. In the winter of 1890-91 they were unusually numerous. I shot two, one of which I had preserved, and I might have shot several others. On one occasion I counted forty on the inland water. During this winter, swans were plentiful on all the Donegal lakes.

Tadorna cornuta, G. S. Gmel.—COMMON SHELDRAKE.—At least one pair breed at Inch each season. A pair bred this year on the golf-links at Lisfannon, halfway between Fahan and Buncrana. I did not seek to discover their nest, as I feared that if I inadvertently drew the attention of the "caddies" to its existence, its non-existence would soon follow. I observed the male bird almost daily, while the female was sitting, and saw the young birds afterwards with their parents. I have been told by an old resident at Inch that before the embankments were made Sheldrake bred freely on the face of a hill near the present railway station.

- T. casarca**, Linn.—**RUDDY SHELDRAKE**.—Six of these birds appeared at Inch in the middle of August in the present year. Two were shot by local sportsmen, and have been preserved. I have never heard of their being previously observed in Lough Swilly.
- Anas boscas**, Linn.—**WILD DUCK**.—Breed numerously near Inch, and large numbers of visitors arrive each autumn.
- A. strepera**, Linn.—**GADWALL**.—Very rare. I have only known of three being shot during the last three years. One of these I secured in January of the present year, and I have had it preserved.
- Spatula clypeata**, Linn.—**SHOVELLER**.—One or two pairs breed at or near Inch each season. The migratory birds arrive in October. They soon become very shy, and rarely fall to the gun of the flight-shooter. No bird is more difficult to retrieve than a wounded Shoveller.
- Dafla acuta**, Linn.—**PINTAIL**.—Plentiful at Inch in February and the beginning of March. A few are present at Inch all winter; but during the latter half of February their numbers increase greatly. Apparently these ducks winter further south than Donegal, and rest on our waters for a short time before starting on their journey north.
- Querquedula crecca**, Linn.—**TEAL**.—A considerable number breed near Inch, and about the end of September the winter visitors arrive.
- Mareca penelope**, Linn.—**WIGEON**.—Begin to arrive towards the end of September, and are the most numerous of our ducks. Flocks of several thousands may frequently be seen on the sea between Inch and Fahan. Unless in very severe weather, they stay on the sea during the day, and fly to the inland water at dusk, flying out to sea at dawn. I have seen Wigeon at Inch in the middle of May, but I have never heard of their breeding with us.
- Fuligula ferina**, Linn.—**POCHARD**.—Plentiful at Inch all the winter, but most plentiful in the months of December and January. I have noticed that Pochards very frequently congregate in small flocks, all of one sex.
- F. cristata**, Leach.—**TUFTED DUCK**.—Not very plentiful; each winter, however, I have shot a few.
- F. marila**, Linn.—**SCAUP**.—Next to the Wigeon the most plentiful of the winter visitors to Inch. A few Scaup remain on the inland water all summer, but I believe they are wounded birds which have not recovered their power of flight sufficiently to join their companions in the northern migration. I have never heard of their breeding.
- Clangula glaucion**, Linn.—**GOLDEN EYE**.—Arrive at Inch in great numbers towards the end of October, and continue plentiful till March. I have seen a few in July, but these were probably wounded birds, unable for the northern migration. The Golden Eye differs from almost all the other ducks in having an inclination to rest on the inland water at Inch during the day, if not disturbed, and fly to the sea towards the evening. They are not as gregarious as the Pochard, Scaup, or Wigeon, preferring to fly in small flocks of from ten to twenty.
- Harelda glacialis**, Linn.—**LONG-TAILED DUCK**.—Rather rare. One or two turn up in each winter's shooting, generally young birds.
- Edemia nigra**, Linn.—**COMMON SCOTER**.—May be noticed occasionally near the mouth of Lough Swilly, but I have never seen a specimen at Inch.
- Mergus merganser**, Linn.—**GOOSANDER**. Very rare. A fine specimen was shot by one of my sons a few years ago, but it was too much injured to preserve.
- Mergus serrator**, Linn.—**RED-BREASTED MERGANSER**. Very plentiful during the winter months. I have seen them at Inch during the summer, but I am not aware of their breeding in the locality.
- Mergus albellus**, Linn.—**SMEW**.—Very rare. I shot one in January 1891, but failed to secure it. About the same time another was shot by a gentleman residing near Inch, and he had it preserved.
- Fulica atra**, Linn.—**COOT**.—A considerable number of Coots breed at

Inch, but not enough to account for a tithe of the large numbers which collect there during the winter months. A flock of some thousands may frequently be seen on the inland water, and large flocks also congregate on the sea. Although most reluctant to fly, the Coot is strong on the wing.

Larus marinus, Linn.—**GREAT BLACK-BACKED GULL**.—All the more common Gulls are plentiful at Inch during the winter. It is a most favourable station for observing the habits of the Great Black-backed. Five or six of these powerful birds are usually flying round Inch on the look-out for any unfortunate Duck or Widgeon which may have been winged by the punt-gunners or flight-shooters. I have never seen them attack an unwounded bird, but the terror which the presence of one of them inspires, even in a large flock of Brent Geese, is most remarkable. A wounded bird rarely escapes them, as no matter how persistently it may dive, they are always ready to swoop down on it the moment it shows on the surface. After a time the bird becomes too exhausted to dive without a short rest, and is then killed by a single blow on the head from the Gull's beak. I have seen them attempt to take fish from both the Cormorant and the Great Northern Diver, but both of these are too expert divers to be easily robbed. As a rule, the Great Black-back reigns undisputed tyrant on the water at Inch. The only exception to this rule I have observed, came under my notice in January, 1891. A Peregrine was perched on a heap of stones near the water's edge evidently meditating a dash at a flock of Green Plovers on a mud bank. A Black-back was beating over the water on the look-out for wounded duck, and as soon as he swooped over the plovers, they scattered in every direction. The Peregrine, I suppose, deeming this an unfair interference with his sport, and thinking that the rule—"Hawks dinna pick out hawk's een," might for once be disregarded, rose perpendicularly in the air, and struck at the Gull. The astonishment and rage of the latter were extreme, and he had barely time to wheel round to present his beak to his assailant. The falcon swerved from the shock, but a second and third time struck at the gull, which I expected to see killed. He was always, however, able to present his beak to his foe, who seemed to recognise clearly that impact on this meant death, and swerved before collision. The contest ended in a drawn battle, as the Gull's attempt to assume the offensive were futile.

Colymbus glacialis, Linn.—**GREAT NORTHERN DIVER**.—During the winter three or four pairs will always be found fishing in the sea near Inch. A favourite resort for a pair is the bay at the south side of the island. These birds go in pairs, and when a pair select a fishing-ground, they keep possession of it. If one of them be shot, by the next day a pair will be found in occupation. Probably the survivor of the original pair has been driven away by the joint efforts of his supplanters. Like most of the Divers, this bird rarely flies, though when it does fly, it is strong on the wing. I have occasionally seen a solitary bird in summer.

C. septentrionalis, Linn.—**RED-THROATED DIVER**.—During the winter a few of these birds are always fishing in the sea near the Inch embankments. Unlike the Northern Diver, they do not fish in pairs. They are more disposed to fly than the Northern Diver, and I have shot them when flight-shooting.

C. arcticus, Linn.—**BLACK-THROATED DIVER**.—A specimen of this rare diver was secured on the south side of Inch on November 7th, 1892, by my friend Rev. Prof. Henry, who has had it preserved.

Podiceps fluviatilis, Tunstall.—**DAB-CHICK**.—Plentiful on the inland water at Inch.

P. auritus, Linn.—**SLAVONIAN OR DUSKY GREBE**.—Not very plentiful. Every winter, however, and during the entire winter, one or two may be seen fishing in the bay on the south side of Inch.

A number of birds make a short stay at Inch during the autumn, but do not winter with us. Among these may be

mentioned the Whimbrel, the Bar-tailed Godwit, and the Knot. The Black-tailed Godwit is also an occasional visitor. A bird which used to be extremely plentiful with us all the winter, the Golden Plover, has become much scarcer than formerly, and seems disposed to limit its stay with us to a short time in the end of autumn. I can suggest no reason for this. On the other hand, the number of Curlew which winter with us, has of late years, largely increased. This I attribute to the fact that we have had no long-continued frost for the last six or seven years. In long-continued frost the mud flats on which the Curlew mainly feed, become gradually coated over with the floating ice deposited by the receding tide, and then hundreds of them perish for lack of food. I recollect that, towards the end of a severe frost which occurred seven or eight years ago, it was possible to knock down Curlew with a stick in the fields adjoining Lough Swilly and Lough Foyle.

THE IRISH LAND AND FRESHWATER MOLLUSCA.

BY R. F. SCHARFF, PH.D., B.SC.

(Concluded from page 153.)

GASTROPODA.

PROSOBRANCHIATA.

GENUS—**ACME**.

Acme lineata, Drap.

I. — III. IV. V. VI. VII. VIII. — — XI. XII.

This species is widely distributed in Ireland. It should be looked for among moss and under stones in damp localities.

FOREIGN DISTRIBUTION.—Great Britain, France, south Germany, Austria, Switzerland, Italy, Algiers, and Morocco.

GENUS—**CYCLOSTOMA**.

Cyclostoma elegans, Müll.

— — — — V.? — — — — XI.? —

It appears that hitherto only dead shells of this species have been found on various parts of the coast, which induced Thompson (15) to doubt its being indigenous. Mr. Milne sent me a specimen which had been taken at Inch (Donegal), but it could not be ascertained whether it had lived in the locality.

GENUS—**PALUDINA**.

Paludina vivipara, L.

This large freshwater species is said to have been found by Capt. Brown in a stream at Newtownards, Co. Down; I hope some of our northern conchologists will carefully investigate that district. Thompson (15) never saw an Irish specimen, and it must, therefore, be placed among those doubtfully native.

GENUS—**BYTHINIA.****Bythinia tentaculata**, L.

— II. — — V. VI. VII. VIII. IX. X. — XII.

In the eastern counties this species is pretty common, but it appears to be absent in the south-west of Ireland.

FOREIGN DISTRIBUTION.—Great Britain, throughout continental Europe, Asia Minor, Kashmir, Algiers, Morocco, and Siberia.

GENUS—**HYDROBIA.****Hydrobia ventrosa**, Mont.

— — — — V. — — — — — XII.

This species, like the next, is a brackish-water form occurring in estuaries, such as portions of Dublin Bay and Larne Lough.

FOREIGN DISTRIBUTION.—Coasts of England and Wales, Sweden, France, Portugal, and Algiers.

Hydrobia ulvæ, Penn.

— — — — V. — — — — IX. — — XII.

Miss Warren records this species from the coast of Sligo, and it is common in many localities along the east coast.

FOREIGN DISTRIBUTION.—Coasts of Great Britain, south Scandinavia, Germany, and France.

GENUS—**VALVATA.****Valvata piscinalis**, Müll.

— II. — IV. V. VI. VII. VIII. IX. X. XI. XII.

This is a common species in slowly moving or stagnant waters in most parts of Ireland.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Finland, Russia, Germany, Switzerland, Transylvania, Austria, France, north Italy, Spain, Portugal, Thibet, Turkestan, Kashmir, and Siberia; (a closely allied species *V. sincera*, in North America).

Valvata cristata, Müll.

— — — — V. — VII. — IX. X. XI.? —

This small species has not been recorded from many Irish localities, and seems quite absent in the south-west.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, south Russia, Transylvania, Austria, Switzerland, Germany, France, Italy, Corsica, and Sicily.

GENUS—**NERITINA.****Neritina fluviatilis**, L.

I. II. — — V. VI. VII. VIII. IX. — — —

In the north of Ireland this species seems to be absent, and in the east it is chiefly found in canals by which it may have been brought from the west, where it is more common.

FOREIGN DISTRIBUTION.—England, Scotland, Scandinavia, Finland, south Russia, central and west Germany, Galicia, north Italy, France, and Spain.

LAMELLIBRANCHIATA.

GENUS—**SPHÆRIUM**.**Sphærium rivicola**, Leach.

— — — — V. — — — — —

This species was not known to Thompson (15) as Irish, but Jeffreys (8) records it from Dublin. Although I have never seen an Irish specimen, I believe, from descriptions I have received, that it occurs in the Liffey at Lucan near Dublin.

FOREIGN DISTRIBUTION.—England, north and central Germany, Austria, Galicia, south Russia, and France.

Sphærium corneum, L.

I. II. — — V. — VII. VIII. IX. X. — XII.

In small ponds and marshes this species is generally distributed in Ireland.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Transylvania, Austria, Germany, Switzerland, Italy, Sicily, France, and Spain.

Sphærium lacustre, Müll.

I. II. — IV. V. — — — — —

In the north of Ireland this species appears to be absent, and in the south and east it is decidedly rare.

FOREIGN DISTRIBUTION.—England, Wales, south Scandinavia, Finland, Russia, Transylvania, Austria, Germany, Italy, Sicily, Corsica, France, Spain, Portugal, Algiers, Siberia, and Kamschatka.

GENUS—**PISIDIUM**.**Pisidium amnicum**, Müll.

— — — — V. VI. VII. — — X. — XII.

All other species of the genus *Pisidium* are extremely difficult to determine, but this, owing to its large size and distinct concentric grooves, is readily recognisable. It has not been found in the south of Ireland.

FOREIGN DISTRIBUTION.—England, Wales, Iceland, south Scandinavia, Finland, Russia, Galicia, Austria, Germany, Switzerland, Italy, Sicily, France, Algiers, and Siberia.

Pisidium globulare, West.

— — — — — VII. — — — — —

The only specimens of this *Pisidium* were taken in a small pond in a wood near Mullingar, and were determined by Prof. Boettger.

FOREIGN DISTRIBUTION.—England and Scandinavia.

Pisidium henslowianum, Shepp.

I. — — — V. — VII. — — — XI. —

Like most of the other species of *Pisidium*, this is found in stagnant or slowly-moving waters, but it is rare, and the only Irish specimen I have seen was obtained in Donegal by Mr. R. Patterson.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Germany, Switzerland, and France.

Pisidium pulchellum, Jenyns.

I. — — — — — IX. — XI. XII.

This handsome species is generally distributed according to Thompson (15), but I have as yet only a few records.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, south Germany, and France.

Pisidium nitidum, Jenyns.

I. — III. — — — VII. VIII. IX. — — XII.

This species occurs chiefly in ponds and lakes along the mountainous districts of the west and north of Ireland.

FOREIGN DISTRIBUTION.—Great Britain, Iceland, Scandinavia, France, and south Germany.

Pisidium fontinale, C. Pfr.

I. — — — V. — VII. VIII. IX. — XI. XII.

This very variable species probably includes Thompson's *P. cinereum*. It is found in the mud of stagnant waters or slowly moving streams.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Austria, Switzerland, Germany, France, Italy, Sicily, Spain, Algiers and Syria.

Pisidium milium, Held.

— — — IV. — — — IX. — — —

P. roscum of Jeffreys is this species. It seems to have been overlooked by Thompson, and is probably rare in Ireland. Miss Warren sent me specimens from Co. Sligo.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Russia, Galicia, Austria, Switzerland, Germany, France, Algiers, and Siberia.

Pisidium obtusale, C. Pfr.

— — — — — VII. — IX. — — XII.

According to Thompson this is one of the rarest species in Ireland. It has not yet been discovered in eastern or southern Ireland.

FOREIGN DISTRIBUTION.—North England, Scandinavia, Transylvania, Germany, Switzerland and France.

Pisidium pusillum, Gmel.

I. II. — — V. — VII. VIII. IX. — — —

This, the most common of the Irish *Pisidia*, is rarely met with anywhere, except in marshes.

FOREIGN DISTRIBUTION.—Great Britain, Iceland, south Scandinavia, Russia, Transylvania, Switzerland, Germany, France, and Siberia.

GENUS—**UNIO**.**Unio margaritifer**, L.

I. II. — IV. V. — — VIII. IX. X. XI. XII.

This species differs anatomically so much from all other species of *Unio* that many conchologists put it under a separate genus, *Margaritana*. It is the only Irish species of the genus, and is found chiefly in the mountainous districts. From this shell pearls have been obtained in great quantity, especially in Tyrone and Connemara.

FOREIGN DISTRIBUTION.—Great Britain, Scandinavia, Finland, north Russia, Bohemia, Germany, France, Spain, Portugal, and Kamschatka.

GENUS—**ANODONTA.****Anodonta cygnea**, L.

I. — — — V. — VII. — IX. X. — XII.

Many authors believe that all the European *Anodonta* are referable to two species, and that the Irish *A. cygnea* is merely one of the numerous forms of *A. variabilis*, Drap.; but I would prefer for the present to retain the species under its old name. In many of the northern lakes it is extremely common, and is said to be eaten by the peasantry.

FOREIGN DISTRIBUTION.—Great Britain, south Scandinavia, Finland, Russia, Transylvania, Austria, Germany, Switzerland, Italy, Sicily, France, Spain, Portugal, Turkestan, Siberia, and Canada.

ADDENDUM.

I unfortunately omitted in my list of papers on Irish Mollusca to refer to Miss Warren's paper on the Mollusca of Mayo and Sligo (*Zoologist*, 1879), and to Mr. A. G. More's "Note on the animal of *Linnæa involuta*," (*Ann. Mag. Nat. Hist.*, 4th ser. vol. iv., 1869). The latter contains a good figure and description of the animal and shell of this remarkable Irish mollusc, and the author points out the mistake made by some conchologists in placing it under the genus *Amphipeplea*.

CORRIGENDUM.

I have also to draw attention to a slip in the records of *Geomalacus maculosus*. It does not occur in district II.

THE CHARACTERISTIC PLANTS OF CO. WEXFORD.

BY G. E. H. BARRETT-HAMILTON AND C. B. MOFFAT.

(Concluded from page 158.)

Wahlenbergia hederacea, Reich.—A characteristic plant in the valley of the river Urrin, and by the higher feeders of the Boro (C. B. M.).

Chlora perfoliata , Linn.	{	All frequent in upland pastures of N. W. The first seems widely distributed throughout the county, while <i>Gentiana campestris</i> appears the least plentiful, and, unlike the other two, has not been recorded as found on the coast by Mr. Hart.
Gentiana amarella , "		
G. campestris , "		

Erythræa pulchella, Fries.—*Curacloa* (*Cyb. Hib. Supp.*)—Near Rosslare, and on the Greater Saltee Island (Hart).

Convolvulus soldanella, Linn.—Common on the south, locally abundant on the east coast (Hart).

Cynoglossum officinale, Linn.—Carnsore, Cahore, and Rosslare Points, Ballymoney, Churchtown, etc. (Hart).

Echium vulgare, Linn.—Frequent, especially on high ground towards the north-west.

Myosotis collina, Hoffm.—Two localities on east coast, at Courtown (Hart), and Rosslare (G. E. H. B.-H.).

- Orobanche rapum**, Thuill.—Abundant on broom in parts of Killoughrim Forest (C. B. M.), and of occasional occurrence elsewhere in both north and south. Sometimes exceeds three feet in height.
- O. hederæ**, Duby.—On ivy at Duncannon Fort (G. E. H. B.-H.).
- *O. minor**, Linn.—Is now an abundant parasitical weed in nearly all clover-fields throughout the district surrounding Ballyhyland, where tall specimens measure two feet three inches in height, and has been noticed in most parts of the county. Was first observed in the county in 1867, by Miss E. M. Farmer (*Cyb. Hib.*), and in 1872 was described by Mr. More (*ib.*) as “scarcely yet established.”
- Linaria elatine**, Mill.—Near Bannow (*Cyb. Hib.*); Greater Saltee Island (Hart); abundant in corn-fields about Alderton (Miss Glascott).
- L. vulgaris**, Mill.—Frequent in north, apparently less so in south.
- Scrophularia aquatica**, Linn.—Frequent.
- Salvia verbenaca**, Linn.—Carnsore, Greenore, and Duncannon Sands (Hart); also about Duncannon Fort and Rosslare (G. E. H. B.-H.).
- Scutellaria minor**, Linn.—A prevalent species in most bogs towards the north-west, and found by Miss Glascott in a marsh on the Barrow.
- Stachys arvensis**, Linn.—A very common weed, apparently throughout the whole county,
- Pinguicula lusitanica**, Linn.—Common in all bogs from the mountains to Ballyhyland, Killoughrim, etc. (C. B. M.), and reaching eastward to Enniscorthy (*Cyb. Hib.*)
- Utricularia minor**, Linn.—Ballykelly Bog (Miss Glascott).
- Anagallis arvensis**, Linn., var. *cærulea*.—At Alderton (Miss Glascott), and Kilmanock (G. E. H. B.-H.).
- Statice occidentalis**, Lloyd.—Baginbun Head, and Hook Head (Hart).
- Chenopodium rubrum**, Linn.—Rosslare, Raven Point, Saltees, etc. (Hart).
- Atriplex littoralis**, Linn.—Hook Head, Tacumshin, Raven Point, etc. (Hart).
- Rumex maritimus**, Linn.—Plentiful at Lady’s Island Lake (Hart).
- R. hydrolapathum**, Huds.—Ballyconigar (*Cyb. Hib.*); Edermine, Curacloa, and Lady’s Island Lake (Hart); Fisherstown (Miss Glascott), and Kilmanock (G. E. H. B.-H.).
- Empetrum nigrum**, Linn.—Plentiful on Mount Leinster (*Cyb. Hib.*); sparingly near summit of Blackstairs (2,409 feet), (C. B. M.).
- Euphorbia paralias**, Linn.—Frequent all round the sandy coast; found on the Saltee Islands (Hart).
- E. portlandica**, Linn.—Many localities all round coast, from near Arklow to Duncannon Fort and Kilmanock.
- E. exigua**, Linn.—A common corn-field weed in many if not all parts of the county.
- Orchis pyramidalis**, Linn.—Frequent on the coast.
- Habenaria viridis**, R. Br.—Raven Point (Hart).
- H. bifolia**, R. Br.—Grows abundantly in several heathy bogs about Ballyhyland, and seems more common throughout the county than *H. chlorantha*, Bab.
- Ophrys apifera**, Huds.—At least nine localities, chiefly near the coast.
- Spiranthes autumnalis**, Rich.—Frequent about Alderton (Miss Glascott); Fisherstown and Kilmanock, rare (G. E. H. B.-H.).
- Epipactis latifolia**, All.—Rare, but has several isolated stations along the Slaney and its tributaries, the Urrin, Boro, etc. (C. B. M.).
- E. palustris**, Linn.—Frequent along the east coast; most abundant at Raven Point (Hart).
- Asparagus officinalis**, Linn.—On the shore near Wexford, abundantly, and on sandhills in Ballyteigue Bay (*Cyb. Hib.*); “Bar of the Lough,” between Crossfarnogue and Bannow, and at Bannow Island (Hart). Found only in the counties of Wexford and Waterford.
- Allium vineale**, Linn.—Not unfrequent about Alderton, Kilmanock, etc.
- Juncus acutus**, Linn.—In suitable localities along the whole east coast, but not on the south (Hart).

- Butomus umbellatus**, Linn.—Found in a pond near Bannow by Mrs. Boyce. Not hitherto recorded for D. 4 (*Cyb. Hib.*).
- Eleocharis uniglumis**, Linn.—Alderton (Miss Glascott).
- E. multicaulis**, Sm.—A somewhat prevalent species in bogs about Ballyhyland, where it is commoner than *E. palustris*, R. Br. (C. B. M.). In the south at Alderton (Miss Glascott).
- Scirpus savii**, S. and M.—Raven Point, Lady's Island Lake, and Saltee Island (Hart); Alderton (Miss Glascott), and Dunbrody (G. E. H. B.-H.).
- Carex divisa**, Huds.—Four stations for this very rare sedge have been discovered by Miss Glascott,—1. By the New Bridge, Dunbrody; 2. By the Causeway, Fishers'-town; 3. Near the Pill, Alderton; 4. Marshes near Killowen, near Alderton.
- C. divulsa**, Good.—In wood above Glenwater Bay, Dunbrody Park (G. E. H. B.-H.).
- Alopecurus agrestis**, Linn.—Is found by Miss Glascott at Alderton, "frequent in pastures and in a wooded glen."
- Holcus mollis**, Linn.—Apparently not unfrequent. Reaches 1,000 feet on Blackstairs (C. B. M.).
- Trisetum flavescens**, Beauv.—Alderton (Miss Glascott); abundant at Ballyhyland, etc.; probably frequent (C. B. M.).
- Glyceria aquatica**, Sm.—Ballyconigar, etc. (*Cyb. Hib.*), Hart; many localities near New Ross.
- Sclerochloa distans**, Bab.—Alderton and Ballyvarna marshes (Miss Glascott).
- Festuca uniglumis**, Sol.—Sandhills from Arklow to Courtown (*Cyb. Hib.*), and at Cahore and Rosslare Points, Curacloa, etc. (Hart).
- F. sylvatica**, Vill.—Wood near Newtownbarry (*Wade Rar.*, *Cyb. Hib.*).
- Elymus arenarius**, Linn.—Curacloa (*Cyb. Hib.*); Rosslare, Greenore, and Raven Points (Hart).
- Hordeum pratense**, Huds.—Frequent in marshes near the Barrow (Miss Glascott), and about Kilmanock, etc. (G. E. H. B.-H.).
- Equisetum moorei**, Newman, 1853.—Sandhills of east coast. Not met with south of Wexford Harbour (Hart).
- Lastrea æmula**, Brack.—Has been found at Dunbrody Park, at Killanne Rectory, and in Killoughrim (C. B. M.).
- L. oreopteris**, Presl.—The prevailing fern in the upper part of the Urrin Valley, and near Blackstairs.
- Hymenophyllum tunbrigense**, Sm.—Had lately two stations near Wexford, of which but one now survives. Mr. Cuthbert lately records it from near Courtown (*I. N.* p. 168).
- H. wilsoni**, Hook.—On Mount Leinster (*Cyb. Hib.*); and above 2,400 feet on Blackstairs (C. B. M.).

No species in the foregoing list is peculiar to the County Wexford. *Asparagus officinalis*, however, might almost be claimed as such, as it appears to extend no further from the Wexford boundary than to Tramore, on the adjacent Waterford coast. The other indigenous plants most characteristic of the county are probably *Matthiola sinuata*, *Cochlearia anglica*, *Diotis maritima*, and *Carex divisa*; while of non-natives by far the most noticeable is *Orobanche minor*, which is not yet claimed as a fully-naturalized species for any other county. The members of our flora referred to Watson's Scottish type are *Thalictrum minus*, *Empetrum nigrum*, *Eleocharis uniglumis*, *Festuca sylvatica*, *Elymus arenarius*, and (if rightly to be so classed) *Equisetum moorei*.

QUARTZITES AND QUARTZ-ROCKS.

BY G. H. KINAHAN, M.R.I.A.

(Concluded from p. 166.)

PART II.—QUARTZITES.

As already suggested, the great difficulties in connection with the quartzites are to discover marks and tokens by which their exact terrane can be determined.

Experience teaches that in all the tracts of each different geological age there are certain peculiarities common to all, although in some areas much more prominent than in others. I have, however, the audacity to believe that after lengthened and careful field study, I can determine in any special area, in the field, but not from hand-specimens, the age of the different quartzites; but, at the same time, it would be hard to explain the reasons by which I come to my conclusions, so that rarely have I been able to convince any of my colleagues that the differences between the different rocks were quite plain to me. The late Prof. Carvill Lewis was able at once to see and appreciate the proofs, but he had studied in America.

After the examination and study of a section, I have sat down on a mass of quartzite, and stated to my comrade: "These quartzites are thousands of years older than those," pointing to a cliff a hundred yards away. I have lit one pipe, two pipes, even six pipes of tobacco, while he has been wandering about and collecting perfectly uninformative specimens. Of course, when he presented them to me and defied me to point out the differences between them and the quartzite I was sitting on, I could not do so, as his collection was made solely to illustrate details, not the masses.¹ When he was pointed out the specialities of the older rocks, his reply was, "Oh, I will show the same in your newer rocks!" This, of course, after repeated attempts he failed to do. The above describes what takes place when in the field with those geologists who would make the rocks suit their preconceived ideas, instead of their conclusions being founded on what the rocks prove. Such geologists have, however, this excuse—it is no child's play to give definitions by which one quartzite can be distinguished from another, as is illustrated by the long time it has taken to disentangle the geology of the Great Lakes District in the United States and the Dominion in America.

In this area, for years, the Potsdam Sandstone, and the conformably underlying quartzites, were supposed all to belong

¹ Since the above was written, Prof. Winchell in his preliminary report on the ancient rocks of Minnesota draws attention to the difference between the study of rocks "in masses" and "in detail."

to one group, the difference in aspect being supposed to be solely due to local circumstances. Logan, however, showed that there must be a considerable difference in age between the Potsdam and the underlying Huronian quartzites at St. Marie River, while since then, Irvine, Van Hise, Lawson, and others, have traced out profound unconformabilities which prove that quartzites, formerly supposed to be all portions of the Potsdam, may belong to strata on different geological horizons, and also to distinct terranes.

In Central Wisconsin, in the neighbourhood of Baraboo, the Potsdams seem to lie horizontally on the Huronian quartzites, but seventy-five miles to the north, near Stevens, they cap Laurentian quartzite and gneiss. More often than not, the Potsdams appear to lie conformably on the Huronian quartzites and the older Laurentians, but when worked out it is not so, as pointed out by R. D. Irvine in his exhaustive report on the "Early Cambrian and Pre-Cambrian Formations of the Lake Superior Regions."

To give all that can be learned from the results of the work in the Lake Superior regions, would occupy too much space; we will therefore only refer to the Marquette and Menominee sections, as in these regions are exhibited the phenomenon that the officers of the staff of the Geological Survey of Ireland are far from realising. In both of these regions (*ibid.* pp. 434 *et seq.*), the newer terranes and the associated older schist series have, by excessive thrusting from the southwest, been so sharply folded up, that now the newer strata occur as long, narrow, lenticular tracts, with a nearly identical strike to that of the older rocks, and apparently with similar dips. Mining operations have, however, proved the latter appearance to be erroneous.¹

The distinctions between the old and later rocks are, *firstly*, in places *the lower beds of the latter are conglomeratic, containing pebbles of the older rocks.* This, however, is a proof that can be easily misconceived, as there are various ways to account for the presence of the pebbles, as illustrated in the writings of the early American investigators and the theories of the British geologists. *Secondly*, as a general rule, *the older rocks are more schistose than the later ones.* This, however, is also an unsatisfactory proof, because at places in the latter, such as at an acute end of a fold, also adjoining upthrust planes, the schistosity may be excessive. *Thirdly*, in the older rocks, *there are granite and other intrusive rock-veins, also fault lines, that come up to but never extend beyond the boundary of the newer rocks.* These are to me uncontestable proofs of an unconformability, yet there are eminent English and Scotch geologists who seem to ignore such evidence.

The ignorance of geologists as to all unconformabilities,

¹ A home example is the "stage-lode," Bonmahon, Co. Waterford.—"Geology of Ireland," p. 28.

except those called "true unconformability" by Irvine, seems to be the reason why this observer has in his report (pp. 390 *et seq.*), taken such pains to explain and illustrate the different types of unconformability. This treatise of his might most advantageously be studied and adopted by some British geologists, as pointed out in my paper, "A New Reading of the Donegal Rocks." Some of Irvine's and Van Hise's descriptions of "cases in which the overlying strata are folded," might have been written to describe sections in Donegal.

The Donegal rocks have been very fully explained in my paper just now referred to. It is therefore only now necessary to give short general descriptions, and refer to some of the errors in the since-published Explanatory Memoir of Sheets 3, etc. The editors of this memoir state that my opinions are not agreed to by any of the other surveyors. This, in part, is incorrect, as at least one of the surveyors did agree with me.

The quartzites of Donegal are more jumbled up than those elsewhere in Ireland. In this county and the adjoining portions of Derry, Tyrone, and Fermanagh, there are, at least, three distinct terranes. The upper, as in previous writings suggested, is probably the equivalent of the slate series (Upper Ordovicians) of Munster; the irregular subordinate fine conglomerates, like the mullaghsawnytes,² being very characteristic of this series.³ The middle terrane I have suggested to be probably the equivalent of the lower Ordovician (Caradoc sandstone and Llandeilo). At its base there are massive quartzites: the rocks on which so much difference of opinion has arisen. Evidently the rocks of the lower terrane (Kilmacrenans) had received rough treatment prior to those of the second terrane having been deposited on and against them, as they had been invaded by intrudes of granites and other intrusive rocks; also they had been distorted by up-thrusts and other convulsions, while subsequently they had been considerably denuded. That the rocks of the middle terrane must be more recent than those of the lower, is ocularly demonstrated, as the younger rocks lie across the foldings in the older, as is conspicuously illustrated in the escarpment between Lough Finn and Glenties.

At Knockanteenbeg⁴ the section "shows the necessary irregularity in the stratigraphical distribution of a basal conglomerate at the junction of two discordant formations."⁵

¹ *Sci. Pro. R. Dublin Soc.* 1890.

² Mullaghsawnyte is a fine conglomeratic rock, characteristic of the upper terrane in Donegal, and largely developed in the ridge of Mullaghsaw, whence the name, invented by Mr. F. W. Egan.

³ "Geology" and "Economic Geology of Ireland."

⁴ A précis of the eliminated description of the rocks of the Knockanteenbeg and Gartan districts, also the transverse and vertical sections, will be found in the paper, "A New Reading of the Donegal Rocks."

⁵ Irvine's "Memoir," p. 398, and Diagram Fig. 73.

In connection with the Knockanteenbeg conglomerates, all the inlying fragments are similar to rocks in the associated underlying Kilmacrenans (probably equivalents of one of the sub-groups of the Algonkians of the United States, or the Ontarians of Canada) yet we are asked to believe that they were brought by ice from districts hundreds of miles away. Furthermore, our credulity is put to a still more severe test, as we are asked to believe these basal conglomeratic beds to be identical with the boulder-bed of the south-west and central Highlands of Scotland. To this so-called boulder-bed, my special attention was directed by Messrs. Horne and Grant-Wilson, the latter sending me specimens, and there is not one iota of semblance between the two, the Scotch "boulder-bed" being identical in aspect with the mullaghsawnyte of the upper terrane in Co. Donegal, as was allowed by all the members of the Irish staff who visited Perthshire with Mr. Grant-Wilson.

The facts that prove that the geology of the Co. Donegal is still in its infancy have been so fully stated in "A New Reading of the Donegal Rocks," that it is unnecessary to repeat them, I will therefore conclude with the following remarks.

In his prefatory note to Explanation of Sheets 3, etc., Sir A. Geikie makes a curious suggestion. Years ago, Griffith mapped the rocks of the Slieve Gullion area as belonging to a much older terrane than the rocks to the northward, while subsequently I pointed out that these rocks to the south-west again appeared from under the Carboniferous in the country between Pettigeo and Ballyshannon. The latter conclusion was come to from personal inspection and information supplied by R. G. Symes. These ancient rocks formed a mountain in the Carboniferous sea, and, consequently, as explained in the "Geology" and "Economic Geology of Ireland," the Carboniferous rocks lying on them belong to different stages in that terrane. Similarly, in more ancient times, this ridge was a mountain in the more ancient (Ordovician?) sea. As in the Carboniferous age, so also in the much more ancient seas, there may have been, or, rather there were, overlaps, the lowest strata being deposited in the county to the north, while the newer strata overlapped one another on the northern flanks of this ancient ridge of hills. This is ocularly proved. In the basal quartzite of the middle terrane the fragments are of the typical Donegal rocks; but, as time went on, the mullaghsawnytes of the upper terrane accumulated; they for the most part being solely composed of fragments from this ridge, apparently principally from the granitic rocks in the Pomeroy Hills. Sir A. Geikie seems to consider he has discovered this "core of old rocks," and, because it exists, that the oldest Donegal rocks must be "on the northern flanks," the evident sources of the fragments in the different accumulations. A conspicuous character of the Irish terranes is the

frequency with which the later rocks have been deposited against cliffs and hills of the older ones. In the Co. Donegal, and neighbouring portions of Londonderry and Tyrone, future explorers will have to allow that the younger rocks in places were accumulated against cliffs and hills of the older; this is conspicuous at Knockanteenbeg; the description and section of it are, however, omitted from the memoir. My conclusions are controverted, and will be controverted, until the results of inversions due to over-thrusting are fully studied and understood. In this area there were at least three distinct times of over-thrusting:—first, an over-thrusting of the Kilmacrennans; second, an over-thrusting of the rocks in the middle terrane; and third, an over-thrusting of the rocks of the upper terrane. The latter is very conspicuous in Innishowen, when the rocks of the middle and lower terranes suffered very little in comparison.

In the Carrick mountain, Wicklow, and in South Wexford it is conspicuously seen that the Ordovicians were accumulated against cliffs of the Oldhamians (Algonkians?) In the different basins of Silurians there are ocular proofs of cliff and hill-margins, while the Carboniferous sea was more or less an archipelago, the islands of older rocks being numerous in the area.

Sir A. Geikie also ignores the adjuncts of the different terranes. Years ago it was pointed out by David Forbes that each has its specific accompaniments, which law laid down by him has been confirmed by all subsequent investigators. Each terrane has as adjuncts its special traps, occurring either as beds or protrudes; these will not be found in a newer terrane, and if in an older they occur, not as an adjunct but as an intrude, and, in general, of a more or less granitic nature. These special adjuncts of the different terranes in the Co. Donegal are very constant, assisting considerably to prove their respective ages. It is unnecessary to mention what they are, as they are specially described in my previous paper.

NOTICE.

A series of papers on "The Earthworms of Ireland," will be commenced in the January number of the *Irish Naturalist*, by REV. HILDERIC FRIEND, F.L.S., of Idle, Bradford, Yorkshire.

MR. FRIEND will be grateful for worms from all parts of the country. They should be sent alive in damp earth or moss, in metal boxes. Packages should be marked "Natural History Specimens."

SOME BEETLES FROM THE DUBLIN DISTRICT.

BY J. M. BROWNE, B.A.

(Read before the Dublin Naturalists' Field Club, 9th Feb., 1892.)

DUBLIN boasts a record of between six and seven hundred species of coleopterous insects out of a total of over three thousand two hundred British species, so that we have ground for hope that not nearly the full number has been placed upon our list. As regards entomology, our district has a number of circumstances in its favour which do not belong to all hunting-grounds. To begin with, it has a considerable stretch of coast, giving opportunities for the capture of maritime insects, many of which never venture any distance inland. Besides this very solid advantage, our district has a varied surface area of mountain, hill, and plain, and in the Wicklow portion we have lake country. During the past three or four years a number of beetles have come under my notice, which have hitherto been unrecorded for Dublin, and in one or two instances for Ireland perhaps, the said instances being attended with considerable interest. Before taking up these insects, however, I would like to glance at the family of beetles which stands at the head of the coleoptera—the *Cicindelidæ* or Tiger-beetles as they are commonly called. This most magnificent division is characterised by the beauty of colouring of its species, which flash with the most exquisite tints, blended with a harmony only equalled by their richness, by the swiftness of movement either on the wing or on the earth, and by the ferocity and carnivorous habits of its members, all which characters have gained for them the name of Tiger-beetles. The typical genus, *Cicindela*, which comprises several hundreds of species, is the largest of any in the family, and its members are very numerous in the hottest parts of the globe, but decrease rapidly in number as we travel from the equator. Four species are inhabitants of England, whilst we in Ireland have but one, the Green Sparkler Beetle, *Cicindela campestris*, which is found in sandy places near the Dublin coast. As the *Cicindelidæ* love the warmth and dryness of tropical climes, so much do they detest the farmer, and fly before the advance of cultivators of the soil. The strength of our species—like that of its relatives—is very great, and I have held a specimen in mid-air by its body whilst it held in its jaws a glove many times its own weight.

The family of the *Carabidæ* comes next in order of precedence to the "Tigers," and is a large and brilliant group, almost all its members being carnivorous, and living upon snails, spiders, and smaller insects. Up till last year a widely-spread species of this family had no place upon our list, and it was remarkable that so important an insect should have been unrecorded

from Dublin. In the May of last year, however, I took a specimen from under a large stone in a pine wood on Killakee mountain, which is a very likely locality, as the species is mostly found in or near woods, and usually under large stones. It is widely spread and not uncommon, but many specimens are apparently never found in any one spot. When taken this insect makes a creaking noise by rubbing its elytra against its abdomen; its scientific title is *Cychrus rostratus*, and it feeds upon molluscs. We next come to the genus *Carabus*, of which six species are natives of Dublin; no new insect has been added to these of late, but three of the recorded ones of some interest were taken last year by Mr. Gore Cuthbert. Of these two are of considerable importance, being very local insects—they are *C. glabratus* and *C. clathratus*, the former having been found on the Dublin mountains, the latter during the excursion of the Club to Callary. Dr. Scharff added *Elaphrus cupreus* to our list, having taken it at Woodlands, Lucan, in 1888; since then it has been found in Wicklow by Mr. Cuthbert. This is an interesting insect, for it and its congeners show an apparent approach, as regards form and rapidity of movement, to the *Cicindelidæ*. This species is widely distributed, and inhabits moist and marshy places, and the banks of lakes and ponds. Half sunken bogs in these spots are likely places to search for the insect.

We now pass on to a group of beetles known as the *Necrophaga*, this name being given them from the habit they have of feeding on dead carcasses. A fine representative of the burying-beetles is added to our list by Mr. Cuthbert. This is *Necrodes littoralis*, which along with other species has the habit of laying its eggs in carrion. The *Necrophori*, a genus closely allied, have the same habits, and sink pits into the earth in which the carcase is placed, then the insects deposit their eggs in it, cover it up, and depart. These beetles are very expert workers, and in a few hours will sink a small animal's body, such as a rat or bird, underground, in this manner rendering its decay more slow and allowing time for the young larvæ to fatten upon its substance.

Going on we come to the Cockchafers, two species of which inhabit Dublin, of which *Melolontha hippocastani* would appear the more common insect. The nut-trees at Poul-a-Phouca were attacked by this beetle in the summer of 1890, a fine specimen tumbling into my net whilst sweeping during the excursion of the Club to that place in that year. Another interesting chafer found in the district is *Serica brunnea*, a stout-bodied long-legged beetle covered with a silken down, found in tree-stumps and heaps of wood-dust found in such places. Five species of *Geotrupes* or "tumble-bugs" are found in Dublin. These are the fine stout black "clocks" that fly about at dusk and often come whizzing into peoples' faces in their unwieldy flight. The rarest of these insects in Dublin is perhaps *G.*

typhæus, which is said to be common in Wicklow—though in my experience and from what I hear, it appears to be rare enough. I possess one specimen—a female—which was found dead at Howth. The males of this species have two long horns on the front of the thorax, projecting on each side of the head. The beautiful rose-beetles are unrepresented on our Dublin catalogue as yet, and, as far as I can hear, are not very common in Ireland generally.

Among the *Elatерidæ* we possess an interesting species, *Corymbites cupreus*. It is one of the finest examples of the British “skipjacks” or click-beetles, and inhabits the blades of long grass. This creature, in common with its relatives, has the habit of shamming death, and dropping to the earth when disturbed. If it falls on its back it has a ready method of righting itself again, for by a sharp movement of its thorax it can spring into the air to a height of some inches and usually lands in proper position. In this operation the insect makes a clicking noise, whence its second popular name. Fourteen species of this group are taken in this part of Ireland.

Of the *Telephoridæ* we have an interesting species added to our list during the summer of 1891. The name of the species is *Dolichosoma nobile*; it was found near Wicklow during the June excursion of the Club, and was pointed out to me by Mr. W. De V. Kane on the flowers of *Convolvuli*, near the sea coast. This is a maritime or semi-maritime species, and is limited to certain parts of England having a liking to the *Convolvuli*. Mr. Cuthbert and I took it in numbers at this place in Wicklow, and I have since found it on the North Bull on the flowers of Dandelion.

Dr. Scharff was very successful in captures of the renowned *Mesites tardii* last summer, having taken the insect in all its stages in Co. Wicklow. Mr. Cuthbert has I believe found it near Dublin.

Several new species have been added to the *Chrysomelidæ*, one at least being of importance. Two of these come from Poul-a-Phouca and were taken during the excursion in 1890. The first is *Gonioctena pallida*, and is I believe new to Ireland. It was first taken by Mr. Sydney Cary, and abounded on the bushes, nut trees, etc. at that place. The other is *Phratora vulgatissima*, a widely distributed beetle, but hitherto not recorded. Both were taken near the banks of the river, and *Gonioctena* occurred in large numbers. The banks of rivers when well covered with herbage and bushes are amongst the best places to search for beetles, and with regard to Poul-a-Phouca, I believe, if it were better worked, it would give a rich harvest. Mr. Cuthbert adds another good insect to our list, namely, *Gastrophysa polygoni*, a pretty little beetle with red thorax and blue wing-cases. Two species of this genus inhabit Britain, the second being *G. raphani*, which is of a bright golden green colour. The remaining *Chrysomelidæ* added are *Phyllotreta punctula*, and *Phædon tumidulum*.

The next group is the *Coccinellidæ* or Lady-Birds, and three at least are added to the number of recorded species. These are *Coccinella oblongoguttata*, taken in 1889 by me, lying crushed on the footpath in Upper Leeson-street. The next is *C. XXII—punctata*, a pretty little yellow species with black spots on it, first found by Dr. Will when over here in 1888, at Lucan, and since then I have received a number from Mr. Frank Neale, who took it largely at Portmarnock. The third species is *C. ocellata*, which was first taken by my brother at Glen Dhu, in 1888.

The next species is *Pogonochærus bidentatus*, a member of the *Longicornia*, and the genus to which it belongs is already represented in the district. The above specimen was found by me in Mr. Latouche's demesne, in the Glen of the Downs, having been dug out of a dead branch which snapped off in my hand, and the point of breakage showed the beetle projecting. It is incomplete, the head and thorax being destroyed, but one of the distinguishing points is seen in the shape of the ends of the elytra or wing-cases, so that there is no difficulty in determining the species. This specimen was taken in June, 1888.

The Dublin list of *Rynchophora* or Weevils, completed some years ago by the late Professor MacNab, contains 41 genera and 103 species. Mr. Cuthbert made several additions to it during last summer, notably *Dorytomus maculatus*, *Anthonomus pedicularius*, *Nanophyes lythri*, and *Barypeithes sulcifrons*.

A number of species in my collection yet await fuller investigation than hitherto I have been able to give them, and it is probable something new may be amongst them. Several of the most typical British beetles are entirely unknown in Ireland, and it yet remains to be proved whether any of these species are to be added to our catalogue. It is to be hoped that much in the way of investigation may be done, and many interesting additions made to the roll of the Dublin Coleoptera.

PLANORBIS RIPARIUS, WEST.; AN ADDITION TO THE BRITISH FAUNA.

BY J. N. MILNE.

With some other shells, I recently sent to Dr. R. F. Scharff specimens of a small *Planorbis*, which I got living at Inch, near the shore of Lough Swilly. He pronounces it to be *Planorbis riparius* of Westerlund—a species new to the British Isles, but recorded from Northern Germany, Sweden, and Siberia.

PROCEEDINGS OF IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent donations comprise a monkey from Hon. B. J. Plunket; a Badger from R. T. Woods, Esq.; a Barn-Owl from Rev. N. Murphy; a Sparrow Hawk from Sergeant Parry; and a Russian Rabbit from S. Clarke, Esq. The Lord Lieutenant visited the gardens on the 26th October, and received an address from the Council.

7,300 persons visited the gardens in October.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 20TH. The club met at Dr. J. A. Scott's, who, with Dr Frazer, expressed the grief of the members at the death of Mr. G. Porte, one of the founders of the Society.

Dr. Scott showed sections taken from a case of actinomycosis which was observed in the lower jaw of a cow, by Sir Charles Cameron in the Dublin abattoir. These sections, which were stained by Gram's method with gentian violet, showed both the "mycelial" and "club" forms of the micro-fungus, and left no doubt as to the true character of the disease. Although this disease of the domestic animals is very common in England and Scotland, and on the Continent of Europe, hitherto no case has been recorded from Ireland. A dried specimen of bone disease in the lower jaw of a horse, showing the characteristic lesion produced in the bones when affected by actinomycosis, is preserved in the Museum of the Royal College of Surgeons in Ireland, but no history whatever is attached to the specimen, which has been for a long time in the museum. Dr. Scott has been informed by Sir Charles Cameron, that he, on a couple of occasions, observed similar cases, but they were not subjected to microscopical examination.

Dr. McWeeney showed sections of the intestine of a rabbit affected with psorospermiosis. In the interior epithelial cells of the mucous membrane, the various stages of development of this intracellular protozoan parasite could be distinctly traced. Dr. McWeeney gave a brief account of the life-history of this species, named by Leuckart *Coccidium perforans*, now recognized, however, as identical with *C. oviforme*, commonly found in the liver of rabbits, and pointed out the great interest possessed by these intracellular parasites in view of the growing probability that such organisms play an important part in the causation of cancer.

Prof. A. C. Haddon showed spicules of an unknown species of sponge, with remarkable creeping habit, found on a shell from Dublin Bay.

Mr. G. H. Carpenter showed the terminal joints of the false leg of a pycnogon, *Nymphon gallicum*, Hoek, from the west coast of Ireland.

Prof. Cole showed sections from a block of limestone from near Tuam, containing *Hemitrypa hibernica*, supporting his contention that the two layers are organically connected, and that the outer one is not due to a parasite.

Mr. W. N. Allen showed drawings of *Cephalozia francisci*, a liverwort found by Mr. McArdle at Howth.

Mr. J. E. Duerden exhibited *Plumularia haleciodes*, Alder a hydroid new to Ireland. A small colony was found growing on *Stenorhynchus*. It was obtained by the Dredging Committee of the Royal Irish Academy in 1885 from Berehaven.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

NOVEMBER 1ST. The President, Prof. M. F. Fitzgerald in the chair. Mr. John H. Greenhill, Mus. Bac., read a paper entitled "The Subject of Electric Lighting," illustrated by experiments.

BELFAST NATURALISTS' FIELD CLUB.

OCTOBER 28TH. The Winter Session was opened by a social meeting in the Exhibition Hall, at which the attendance of members and visitors was nearly 600. A large variety of exhibits was on view, of which some of the more interesting were a large collection of drawings, engravings, etc., illustrative of the history and progress of Belfast; the Club's new photographic albums, in connection with their archæological survey of Ulster, in which were over 300 platinotype photographs of Irish antiquities; photographs taken by members on last season's excursions; collections for which Club's prizes were awarded last year, including beetles (Rev. W. F. Johnson); Carboniferous fossils and geological sketches (Miss S. M. Thompson); geological photographs (Miss Tate); and microscopic slides (H. McCleery); ferns, British and exotic, were shown by W. H. Phillips, F.R.H.S., and Charles McKimm; recent additions to the flora of the north-east of Ireland, and rare plants of Co. Armagh, by R. Lloyd Praeger, M.R.I.A.; and a fine collection of geodes from Iowa, U.S.A., obtained by W. E. Praeger. A number of members were also in attendance with their microscopes, and during the course of the evening there was a lantern display.

NOTES.

BOTANY.

MUSCI.

SOME MOSSES AND HEPATICÆ OF THE BEN BULBEN DISTRICT. It may be interesting to give notes of some of the rarest species of Mosses and Hepaticæ which I collected last summer during a short excursion with the Belfast Field Club to the district. The following species were found at Bundoran:—*Ditrichum flexicaule* (Schleich.) Hampe; *Mollia crispula* (Bruch.) Lindb.; and *Mollia verticillata* (L.) Lindb. On the south-east slope of Ben Bulbin I found *Scapania curta* Mart., and *Leptodontium flexifolium* (Dicks.) Hampe, growing abundantly on dry peaty banks. The latter may easily be recognised in the field by its reddish-yellow colour, and leaves crisped when dry. Dr. Moore records, but with some doubt, two stations for this plant—Cushendall and Killiney. It is well to have another certain locality for a plant which does not appear to be common in Ireland. It has been pointed out in Messrs. Barrington and Vowell's paper on the Ben Bulbin flora, that the place marked King's Mountain on the Ordnance Map should be Sea-Fin, King's Mountain being the point above Glencar Lake. Sea-Fin is a locality given for *Arenaria ciliata* Linn. (*Flor. Hib.*) I saw the plant growing there, and also gathered the following mosses in a ravine on the south side of the same mountain:—*Swartzia inclinata*, Ehrh.; *Orthothecium ruficens*, Dicks.; *Antitrichia curtispindula* (L.), Brid.; *Blepharostoma trichophyllum*, L.; and *Bryum concinnum*, Spruce. The latter resembles *B. filiforme*, Dicks, but is distinguished by its pointed leaves. Only stunted and barren specimens are met with in this country, but I am told it grows much finer in the Tyrol. The only other Irish localities are in Kerry and Sallagh Braes, Co. Antrim. In Slish Wood, on the shores of Lough Gill, were found *Ditrichum flexicaule* (Schleich.) Hampe; *Hyp. stellatum*, var. *protensum*, Brid.; *Leersia contorta* (Walf.) Lindb., all limestone-loving plants, and *Scapania resupinata* (Linn.) Dumort.; *Adelanthus decipiens*, Mitt., and *Plagiochila tridenticulata*, Tayl., a species heretofore only recorded from the south. Some confusion seems to have arisen between Ben Bulbin and Bulbein Mount in Co. Donegal, and plants said to have been found at the former by R. Brown, belong to the latter locality, e.g., *Hyp. denticulatum*, var. *β. obtusifolium*, Hook, and *Bazzania triangularis*, Schleich. He and Templeton made a tour together through Co. Donegal, when these plants were probably collected.—C. H. Waddell, Saintfield, Co. Down.

ZOOLOGY.

INSECTS.

Vanessa io AT HOWTH. With reference to Mr. Starkey's capture of *Vanessia io* at Howth this summer, I think it right to mention that in the summer of 1891 my son set free a considerable number of *V. io* here. When returning from school he brought over the larvæ from Marlborough.—George V. Hart, Howth.

[We thank Prof. Hart for this information. As *V. io* is known to be a Dublin insect, though not a common one, no harm has been done by this introduction. But we would take the opportunity of asking naturalists to abstain from, and discourage the practice of artificially introducing species into districts. Specimens may be captured years afterwards, when the fact of the introduction has been forgotten, and entirely false conclusions as to geographical distribution may be drawn from their occurrence.—EDS.]

LEPIDOPTERA IN CO. DUBLIN. During the past season I obtained in Co. Dublin some moths and larvæ which I think are worth noting. The localities in brackets after each species, are the only other records I can find. One full-fed larva of *Notodonta dromedarius* off poplar, Tibbradden, which has pupated [Co. Wicklow]; a young larva of *Lophopteryx camelina* also off poplar, near Mt. Pelier [Powerscourt and Killarney]; one fine specimen of the noctuid *Hylina ornithopus*, found resting on a wall near Carrickmines, by a friend [Killarney and Wicklow rare]; *Hadena glauca* one, last June flying in garden [Belfast, Londonderry, Rathowen, Killynon]; *Zanclognatha grisealis* resting on a wall near Rathfarnham [Kingstown, Killarney]; and a specimen of the pretty *Cidaria siterata* in oak wood, Mt. Pelier [Co. Wicklow].—J. N. Halbert, Dublin.

MOLLUSCA.

Spirula, Ianthina, AND Velella AT LOUGH SWILLY. In the *Zoologist* for November, Mr. H. C. Hart writes that a number of specimens of *Spirula australis*, *Ianthina rotundata*, and *Velella* sp. have been washed ashore at Port Salon, Lough Swilly.

BIRDS.

ICELAND GULL (**Larus leucopterus**) ON LOUGH SWILLY. Mr. H. C. Hart writes to the *Zoologist* that he has lately seen an Iceland Gull on Lough Swilly, the second that has appeared there this autumn.

RUFFS (**Machetes pugnax**) AT INCH, LOUGH SWILLY.—About 2nd September, Mr. Herbert Williams shot a pair of Ruffs at Inch, one of which (a female), he sent to me for identification. The birds were flushed from a flooded slobland with some four or five inches of water upon it. On 26th October, Mr. John McConnell shot a Ruff at Inch, which he sent to me to identify. It was a fine male.—D. C. Campbell, Londonderry.

THE STOCK-DOVE (**Columba ænas**) IN CO. ANTRIM. It is some few years since the late Rev. J. G. Holmes discovered in Antrim Park what he believed to be the nest of the Stock-dove. It was placed in a hollow under the overhanging bark of Donore river, and contained two eggs which he removed for preservation, without, however, observing the parent bird. Doubts were expressed by some as to the sufficiency of the proofs of identification, no previous record having been made apparently of this species being known in the district; but such may now be set aside, as not only does the bird occur, but by careful observers may be seen in considerable numbers, three or four being frequently seen here amongst a large flock of the Ring-dove. The opportunity for observing these birds whilst at rest are few; for like the Ring-doves, they are exceedingly shy, leaving their feeding grounds when disturbed, and flying long distances before again alighting. Though smaller, they so much resemble the Ring-dove (especially immature specimens on which the unmistakable ring has not shown itself), that undoubtedly they are

mistaken for that species in many instances when shot by sportsmen. To a careful observer, however, the Stock-dove is unmistakable when upon the wing. Congregating as they do with the Ring-doves, they rise with them when disturbed, but as a rule at once separate themselves from the latter, taking a line of their own for some distant haven of refuge. Their flight is a short, laboured, jerky one, not unlike that of the Blue-rock, the wings being rather closely drawn in to the body after each stroke, and this, as distinguished from the strong steady flight with distended wings of a Ring-dove in rapid retreat from danger, is easily observable. During the winter of 1891-2 I obtained a good specimen, now in the hands of Messrs. Williams for preservation; and having frequently observed these birds since, both during the spring and summer months, I have little doubt that they breed in the neighbourhood. The Stock-dove is said to breed at Powerscourt in Co. Wicklow, and other instances may have been recorded. From its similarity to the Ring-dove, and its habits of associating with that species, it is probably much more general in Ireland than it is supposed to be.—H. D. M. Barton, The Bush, Antrim.

[One of the eggs obtained by Rev. J. G. Holmes was forwarded, together with a detailed description of the nest, to Mr. J. E. Harting, F.L.S., who unhesitatingly pronounced it to be the eggs of *C. ænas* (see *Proc. Belfast Nat. Field Club*, 1889-90, p. 211). This bird has also been known to breed in Down and Louth.—Eds.]

GEOLOGY.

SUPPOSED TERTIARY BASALTS, N. W. DONEGAL. In the Memoirs of the Geological Survey the whinstone dykeens of N. W. Donegal, on the authority of Sir A. Geikie, are positively asserted to be of Tertiary age. Proof of this assertion would be most interesting to me.

In the western portion of Connemara (N. W. Galway), and in west Mayo these dykeens are more numerous than elsewhere in Ireland, except, perhaps, Carlingford, Co. Louth. In western Connaught a good deal of trouble was taken with them, and it was proved they were newer than all the associated rocks except dykeens of felstone. Similarly in S. E. Ireland I could never prove whether whinstone or felstone was the youngest. Some of the whinstone dykes and dykeens of Connemara were so similar to those of Carlingford, that I suspected them to be of the same age as the Antrim Eocenes; but in vain were the trials to prove that they were post-Carboniferous, as nowhere in the Carboniferous rocks to the south in Co. Clare, or to the north in Co. Mayo could a trace of them be found, and as far as my experience goes, the same may be said of the Co. Donegal.

In the latter county, they are most conspicuous in the Malin promontory, where they have the appearance of a streak of tar across the associated rocks. Here they occur in such a small area that nothing can be found as to their post-Carboniferous age.

West of Lough Swilly at Ballymastocken there is a small outlier of the basal Carboniferous conglomerates and sandstones ("Economic Geology of Ireland" pp. 246 and 248). In the older terranes to the south and north of this basin, there are, at intervals, a few of these dykeens, but none of them could be found crossing on in connection with the Carboniferous rocks. To the S.W. in the barony of Banagh there is the Mount Charles and Lough Fask Carboniferous basin, and in the country to the north thereof these dykeens are numerous, but I can find no record of these being traced into the Carboniferous rocks. Trappean rocks are indeed associated with these Carboniferous rocks in St. John's Promontory, and at Mount Charles, also at Donegal, etc.; but these to me seem to be of a distinct breed to the rocks in the dykeens. I would therefore like to know on what ground this positive assertion is made. My conclusions and the reasons for them were published years ago, but I would now like them to be disproved or confirmed.—G. H. Kinahan, Fairview, Dublin.



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